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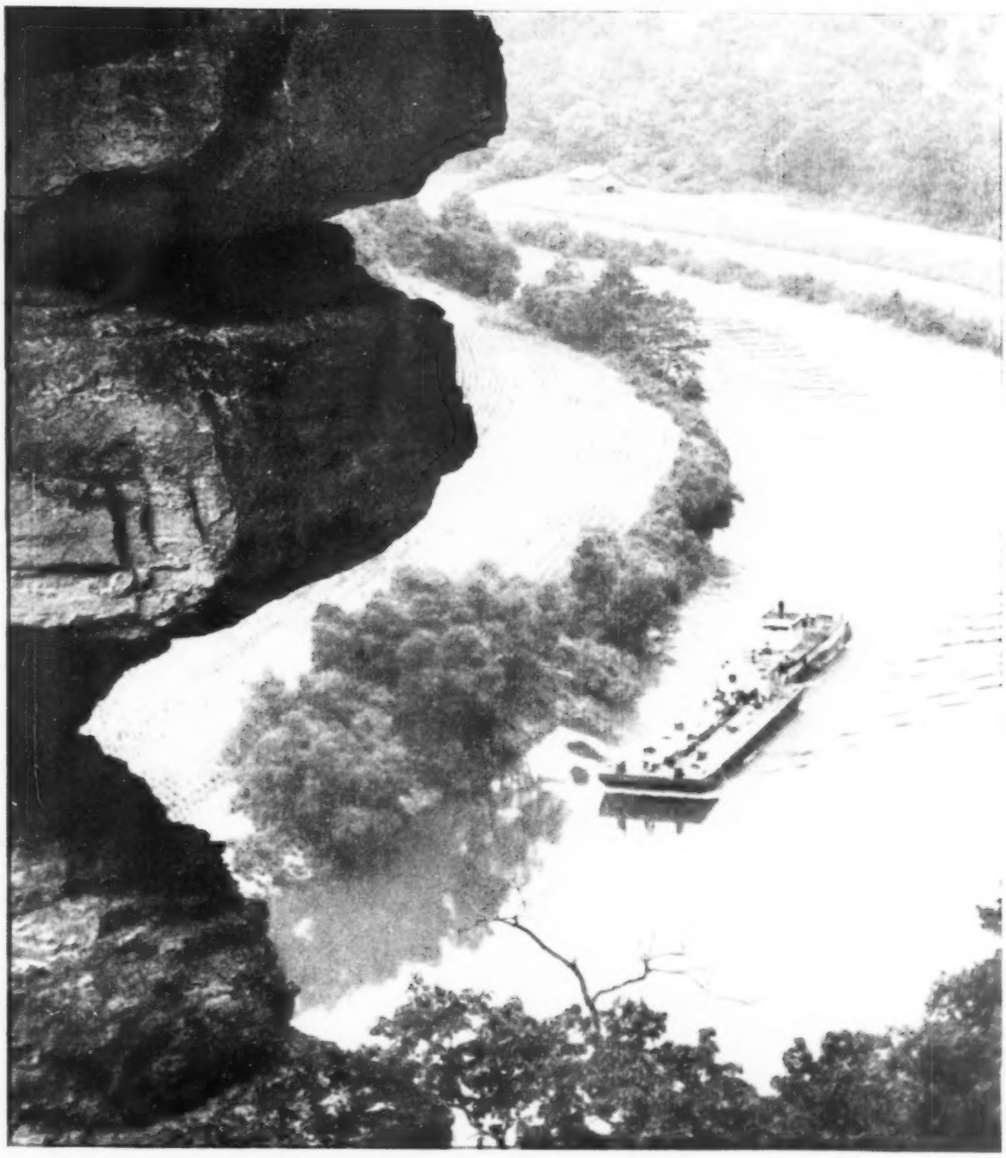

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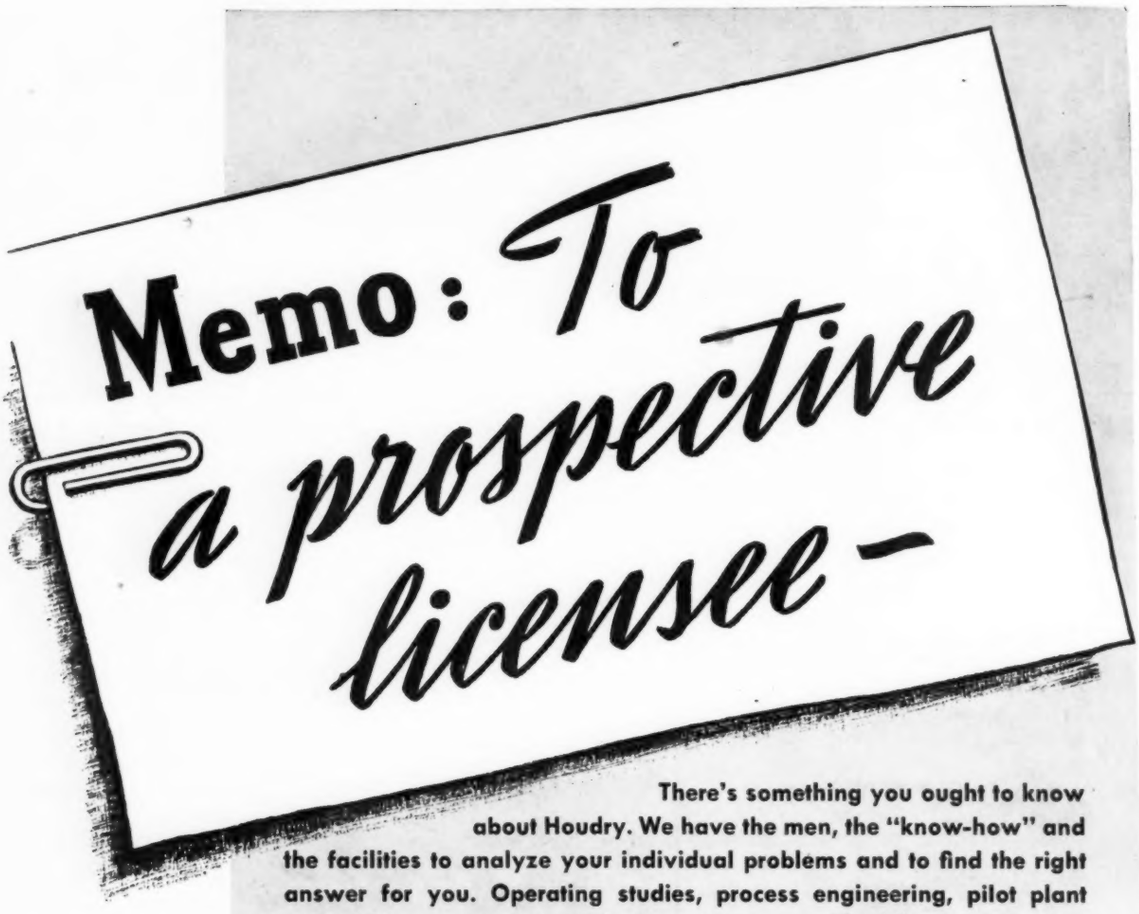

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EDITORIAL

THIS IS NO TIME TO THROTTLE EXPORT TRADE

In all the discussions of post-war conditions to be faced by the United States particular emphasis has been placed on the importance of foreign trade. It has been generally agreed that a volume, both of exports and imports, much above the level of pre-war years was essential to full employment and a high standard of living. Secretary Wallace set the goal of a ten billion dollar export trade.

Aside from the purely commercial aspects of the situation it was recognized that many countries were looking to the United States for commodities that they urgently needed and had been unable to obtain for five years past because the nations' productive energies had been absorbed in supplying the materials of war to the United States. It was felt that the claims of these eager customers were entitled to consideration and regret was expressed that the industrial disturbances that halted production during the early part of the year should have delayed still further the acceptance of orders.

It is not surprising therefore that amazement and dismay was spread throughout circles concerned with international trade by the report widely published early last month that federal authorities were seriously considering the imposition of partial embargos on shipments to other countries. The proposal was attributed to the Civilian Production Administration and was explained as designed to prevent a flight of merchandise to foreign markets following the termination of domestic price controls which then seemed imminent. Coming at a time when licensing requirements had but recently been removed from many lines of manufacture and were still retained on certain goods in short supply the reimposition of restrictions seemed as unnecessary as the reason advanced for it was illogical.

The strong opposition voiced in many parts of the country to eliminating the Office of Price Administration or circumscribing its powers was based on the claim that it would result in a sharp upswing of domestic prices. If that were in fact the effect it would automatically tend to restrict exports. Other nations, faced by the necessity of protecting their own exchange position, certainly would not indulge in unrestrained bidding against domestic buyers for American goods. Moreover, the Department of Commerce still possesses authority through its licensing power to prevent the draining from the domestic market of necessary commodities should such a movement assume serious proportions.

Specifically the proposal of the Civilian Production Administration, as reported by the press, was to freeze monthly shipments abroad to quotas representing average monthly exports during the first six months of 1946. This would be a drastic limitation since the early part of the year was a period when the production of machinery and metal goods was reduced to abnormally low levels.

Short of a complete embargo no step that could be taken would be more disastrous to the trade position of the country than the imposition of such a restriction at this time. Foreign buyers, aware of the difficulties encountered by American manufacturers in meeting accumulated demands, have been willing to wait their turn with domestic purchasers wherever their situation permitted them to do so. Open discrimination against them by government intervention would be resented as a betrayal of trade responsibilities and would be looked upon as evidence of complete indifference on the part of the United States to the needs of outside customers. In a multitude of cases the urgent necessities of business firms abroad has led them, after failure to find acceptance of their orders in the United States, to turn to other countries which, though faced by greater difficulties at home, appreciate the importance of export trade and are willing to give it preference. The manufacturing nations of Western Europe, though their industrial facilities were badly disorganized by the war, are going energetically after foreign orders, are advertising their facilities in enterprising fashion, and are guaranteeing deliveries that cannot be matched in the U. S.

In the past a common complaint against American manufacturers has been that they were interested in export only when the home market was in the doldrums but there is reason to assume that a more intelligent attitude now prevails. In a world in which the interdependence of nations is being recognized more widely than ever before the responsibilities of this relationship should govern policy in the field of commerce no less than in politics and finance. It has been clearly pointed out that maintenance of the national income required to support the heavy costs of government and the established standard of living is as impossible to the United States as it is to other nations without liberal participation in international trade. Under these conditions the placing of unneeded restrictions on American exports through governmental interference would not only handicap national progress but might well lead to national disaster.

SWEDEN . . . . . AN EXPANDING OIL MARKET

By HANS G. TONNDORF

Prior to the war, Sweden was, next to France and Great Britain, the most motorized country of Europe. Largely as a result of the almost unbroken prosperity of the country during the interwar period, there was a rapid growth of motor traffic and oil consumption. With no domestic supplies available Sweden's imports of mineral oils increased between 1926/29 and 1938 from 440,000 to 1,340,000 tons yearly, the United States and Venezuela being the most important sources of supply. Out of the total supplies of mineral oils in 1938, there were 540,000 tons of gasolines and 517,000 tons of fuel oil. Next to coal mineral oils constituted the most important item in Sweden's import trade.

Following the German occupation of Denmark and Norway in April, 1940, Sweden's entire westbound trade was disturbed. Later, within the framework of the safe-conduct traffic, shipping connections with countries of the Western Hemisphere were resumed, though on a reduced scale. The agreement with the belligerent nations provided for oil shipments at a rate of one tanker per quarter but these supplies were entirely reserved for the armed forces. As indicated in the accompanying table wartime oil imports were reduced to a small percentage of the normal amount. In 1941 about 30,000 tons were obtained from German-controlled areas but there were no supplies from countries "inside the blockade" during the following years.

Imports of Mineral Oils 1937-45
(tons—000 omitted)

1937	1,176
1938	1,322
1939	1,475
1940	535
1941	131
1942	105
1943	146
1944	136
1945	192

The shortage of petroleum products was felt more seriously in the industrial life of the country than any other important commodity. Out of 250,000 motor vehicles only 80,000 remained in use, more than half of these being trucks and buses. Practically all of them had to be reconverted to the use of producer-gas, while tractors and fishing boats were driven by wood oil. The mobility of the Swedish Navy was maintained by increased supplies of domestic shale oil.

Although the wartime substitutes covered essential requirements after a fashion, these ersatz fuels were never regarded as acceptable for permanent adoption. Thus, at the end of the war, the Swedish people eagerly awaited the arrival of gasoline and other mineral oils. As the country's financial position was strong there was no need for the imposition of restrictions on imports. Moreover, all the port, storage and distributional facilities had remained in fairly good condition.

In the beginning oil imports had to be restricted because of transport difficulties, but during recent months there has been a steady increase in shipments to Sweden. In December, 1945, the country's imports of gasoline and fuel oil were up to 40,700 and 49,000 tons respectively or not far below the pre-war annual rate.

Transition from the emergency fuels of the war period to gasoline was bridged by the introduction of "motyl 25" consisting of 25 percent alcohol and 75 percent domestic shale oil. Because of its high price, 80 ore (21.6 cents) per liter, this fuel did not invite many to reconvert. Most drivers waited for the arrival of gasoline the price of which was fixed at 43 ore (11.6 cents) per liter in Stockholm and later reduced to 41 ore. This is still considerably more than prewar when gasoline was retailing in the Swedish capital at 27 ore (7.3 cents) per liter. The transition to gasoline is now practically completed as far as passenger cars are concerned although some trucks so far have maintained the producer-gas system, because of their investment in the equipment.

The greatest bottleneck is still the lack of tires. There are about 100,000 automobiles without tires and since November, 1945, only 15,000 cars and 5,000 trucks have reappeared in traffic. Fortunately, the manufacture and importation of tires is increasing rapidly and it is hoped that by the end of the year normal traffic will be largely restored. Automobiles are one of the few items on which supply has been subnormal during the war years in Sweden and import requirements of American automobiles are estimated at 50,000 per year, more than the country will be able to obtain.

While the outlook for oil supply is brightening the coal situation looks gloomy. Coal and coke are indeed much scarcer than at any time during the war and there seems to be no hope for immediate relief. Furthermore, it is believed that coal prices will remain comparatively high for a long time to come.

This being the case there is a strong incentive for the replacement of coal by oil which, for several months, has been available without restrictions. Prewar Sweden consumed only 200,000 tons of fuel oil for heating of houses and in industry, particularly in the iron and steel works. Now it is estimated that during the present year consumption of fuel oil will be raised to 430,000 tons providing the necessary extension of distributional facilities can be accomplished.

A great many Swedish industries, particularly cement works, pulp mills and power stations already have made dispositions for the alteration of fuel arrangements from coal to fuel oil and others are expected to follow suit. The Swedish government is favoring this transition and has provided certain priorities for the acquisition of the necessary equipment. This movement towards increased consumption of fuel oil at the expense of coal and coke will certainly continue next year, thus further broadening the market for liquid fuel.

During the years preceding World War II Sweden used to import nearly all its oil requirements in the form of refined products. Apart from a small asphalt plant there was no refining industry in the country until the Nynas Petroleum, a subsidiary of A. Johnson & Company, erected a plant in Nynashamn, near Stockholm. With an annual capacity of more than 400,000 tons it is of considerable size, even by American standards. Operations started some time before the outbreak of war and were continued until the Skagerak blockade cut it off from its sources of supply. During the war period, its activities were largely confined to refining shale oil. Since oil supplies have been obtainable operations have again started on a large scale.

This refinery, however, is not expected to remain the only one in Sweden. The Johnson concern is now going to expand its refinery business by two further plants, one in Malmo and one in Gothenburg. The Malmo plant is about ready to begin operation and has a capacity of about 3,000 barrels a day. In Gothenburg plans have not proceeded further than the purchase of a site but it is understood that the erection of the plant will soon be commenced.

In addition to Nynas Petroleum, a new competitor will soon enter the Swedish oil market, namely the National Association of Swedish Oil Consumers (Sveriges Oljekonsumenters Riksförbund), a cooperative organization which was formed in 1943 with a capital of $1.2 millions. It will import oil from cooperative producers in the United States, build a refinery of its own and handle the distribution of oil products. Part of the equipment has been bought and it is planned to erect a refinery somewhere in central Sweden, which will be supplied with crude oil from the port of entry through a pipe line.

Although the operations of domestic organizations will be greater in the future than prewar with respect to refining and distributing the raw material still will have to be imported. Sweden is not believed to have commercial deposits of petroleum. During the past few years, some drilling has been undertaken in the south, the so-called Skanor district, but these efforts have not produced any promising results.

On the other hand, domestic production will make a small contribution to total oil supply through substitutes developed during the past few years. Prior to the war there was a production of about 30 million liters of alcohol, derived as a by-product in the manufacture of pulp. During the war period the productive capacity of this commodity has been greatly enlarged. There was some discussion a few months ago with the United States regarding the sale of a large quantity of alcohol to American manufacturers of synthetic rubber but no definitive agreement seems to have been reached. In order to dispose of the surplus of alcohol the oil companies in Sweden are obliged to mix 15 percent of alcohol in their sales of gasoline.

Although without indigenous petroleum, there are large deposits of oil shale in the central part of Sweden. Unfortunately these deposits are not very rich, the oil content averaging from four to six percent as compared with about 20 percent in Estonia where Swedish capital had been employed in the shale oil industry for a quarter of a century.

Although not considered profitable under normal conditions, the utilization of the shale oil reserves became imperative when the war shut off Sweden from its oil supplies. Two plants financed with government capital were erected, one at Kinne-kleva and one at Kvarntorp, the former yielding about 8,300 m^3 and the latter about 82,000 m^3, together around 83,000 tons a year.

In these plants production techniques were adapted to the special features and characteristics of the Swedish shale. At the Kvarntorp plant, a wholly revolutionary method was tried experimentally involving the electrical heating of the shale on the spot instead of moving the bulk material to the ovens.

With the re-appearance of mineral oils from abroad the question has come up whether it is worthwhile to continue the production of shale oil in time of peace. As far as the minor plant at Kinne-kleva is concerned there seems to be unanimity that it should be shut down. As to the Kvarntorp plant recent investigations are said to indicate that it will be able to meet foreign competition by 1951, provided certain improvements and investments are carried out. It is likely that this plant will obtain the necessary support for continued operation, thus supplying the country with 75,000 to 80,000 tons of oil per year.

In the consideration of future operations on the Swedish market, the question of nationalization of oil distribution is, of course, of great significance to oil companies. It is not a new issue. It was first considered, in vague formulations, in a government report of 1933 on the marketing of pulp alcohol. It was further studied in subsequent government reports of 1935 and 1936. Last year, the Commission on Postwar Economic Planning took up the matter again and suggested a renewed investigation of this issue.

The arguments stated by the Commission have not added very much to those presented in previous reports. Thus the majority of the Commission repeated the claim that the competition between the oil companies had resulted in a wasteful "overdimensionation" of the marketing machinery and that the companies, as a result of their price policies, had not left any taxable profits in Sweden. On the other hand, a state monopoly might be able to obtain more favorable prices on the world market and would make possible a more efficient organization of distribution. The majority of the Commission, therefore, suggested that a careful report should be prepared in order to ascertain whether it would be appropriate to replace the present order through (a) a state monoply organization, (b) a state organization and a cooperative organization or (c) possibly these two with private organizations.

In a separate statement the minority of the Commission rejected the idea of state monopoly. It pointed out that the "overdimensionation" of distribution referred to by the majority was due to extraordinary conditions during the great depression. Between 1932-1933 and 1938 gasoline consumption in Sweden rose by 80 percent without being accompanied by any notable expansion of the distributional facilities and, at the same time, the oil companies showed taxable profits in an ordinary way. A state monopoly, the minority asserted, could hardly count upon any goodwill but might well cause troubles in forthcoming trade negotiations with other countries. Recent Gallup polls indicated that 93 percent of car-owners were satisfied with the prewar organization of oil distribution.

Although it is impossible to foretell the outcome of the present issue there seems to be strong evidence that a nationalization of oil distribution is not a probability in the near future. For one thing, the proper time for such action has already passed as it was proposed to carry through the reorganization before the private distributors had started their postwar operations. This has not been possible and the committee appointed for a renewed study of this matter has not yet submitted its reports. Nor has any proposal for the reorganization of oil marketing been put before this year's Riksdag. Of course, the prevailing uncertainty has a somewhat unfavorable influence on the operations of the oil companies as is revealed in their reluctance to expand distribution facilities for the increasing fuel oil consumption.

Recent developments of the Swedish oil market undoubtedly have weakened some of the most potent arguments usually presented by the promotors of nationalization. Thus the two largest oil distributors in Sweden, Standard and Shell, have decided to reduce the number of service-stations in comparison with prewar. In addition to this "rationalization" of distribution there is a growing activity of domestic organizations, one of them representing the special interests of Swedish consumers. This being so it will be hard to discover any improvement which could be obtained through a complete nationalization of oil distribution or any similar type of organization.

Taking all factors into consideration, the overall picture of the Swedish oil market seems to be moderately favorable. The American and British oil companies will meet somewhat increased domestic competition but they will be able to continue their operations. In view of the promising economic outlook and the general stability of the country Sweden will probably experience a steady increase in the consumption of mineral oils, particularly of fuel oil.

New Motor Tanker "*Constance*" Built at Gotaverken Shipyard for Monacus Shipping Company.

MEXICO LAUNCHES REVISION OF ITS OIL INDUSTRY

By Ing. Octavio Benavedes A.

AN elaborate program of reconstruction and expansion has been undertaken by Petroleos Mexicanos. It is intended to bring about a substantial increase in the supply of petroleum products to meet Mexico's rapidly growing demand. At the same time the construction of pipe lines and the relocation of certain refiners will bring about a better distribution of products to domestic consumers. This incidentally is a primary consideration with Pemex in contrast with the conditions existing before expropriation when local requirements were small and the producing companies, then under foreign ownership, gave preference to exports to outside markets. With the assistance of the Arthur G. McKee Company as designers and the Phillips Petroleum Company as technical collaborators the revision of Mexican oil operations now getting under way presents interesting aspects. A brief study of the new projects and installations will be helpful to an understanding of the situation.

Mexico's oil fields and producing zones are located in the eastern coastal states of Tamaulipas and Vera Cruz. For export trade its refineries are strategically located but Petroleos Mexicanos has had to change the allocation of its production in order to make due provision for the growth of internal consumption. The refineries located at Tampico, state of Tamaulipas, will continue to supply export demand and the needs of the northern part of the country while the refineries at Salamanca and Atzcapotzalco, the latter located in a suburb of Mexico City, will satisfy market demands in the central part of Mexico. Poza Rica, the principal oil-field in Mexico, will be the source of crude oil for the supply of the new refineries.

New installations at Poza Rica, in the state of Vera Cruz, northeast of Mexico City, provide for the depropanization of the gas and crude oil production of the field and its recovery in liquid form. Of the total output, 30,000 barrels daily will be carried by pipeline to Tampico and 37,249 barrels daily to the Atzcapotzalco refinery.

Light fractions obtained as a result of the depropanization of the crude oil will be carried to the Mexico City refinery, but the necessary means to pump them to Tampico will also be made available. The light fractions recovered from the absorption process will be sent to Mexico City. Pursuant to future repressuring operations planned for this field, the estimates for the design of the absorption plant were made for a future pressure of 600 lbs. psi. Studies made prior to the adoption of the present projects gave the production results in the three fields of that region shown in Table I.

The installations at Poza Rica field will include the following units:

(1) Stabilization and Desalting of Crude: Two different types of crude will be treated (a) with a high salt content, an average of 23 percent and (b) with a low salt content, an average of 7 percent. The salt content of the mixed crude will be reduced to approximately ten pounds for every thousand barrels after which the propane and lighter products are substantially removed.

(2) Absorption Plant: The purpose here is to recover the isobutane and heavier hydrocarbons from the natural gas and the lighter fractions of the crude stabilization plant, as well as to depropanize this material before adding it to the crude pumped by pipeline to Atzcapotzalco. The gas absorption plant is designed for the recovery of the available isobutane. As indicated, the design and specification of this equipment was planned for a future operation at 600 lbs. psi.

(3) Girbotol Fuel Gas Treater: This equipment is installed under license from the Girdler Corporation for the purpose of separating the hydrogen sulphide and carbon dioxide from the fuel gas to be used in the compressors of the absorption plant and of the field.

(4) Auxiliary Services: Water from the river will be used in the plant for cooling purposes, and settlers and equipment for the purification of water are now being installed. The gas required by the different units will be supplied from the same field. It is interesting to observe that this will be the only Pemex plant where gas will be used for combustion.

The pipeline between Poza Rica and Mexico City is approximately 240 kilometers long. There are 15 kilometers of 12-inch pipe at the Atzcapotzalco end and 20 kilometers of the same size at the Poza Rica end; the remainder is of 10-inch diameter. At present there are seven pump stations including the terminal station at Poza Rica, which also serves the pipelines to Tampico and

Table I—Poza Rica Production

Field No.	Crude B/D	Gas at 400#	Gas at 250#	Gas at 60#	Atmospheric Pressure
I	66,230	48,270	1,060	22,560	3,788
II	31,675	14,866	106	6,866	1,165
III	35,100	25,035	3,249	12,429	2,154
	133,005	88,171	4,415	41,855	7,107

Note: Figures for gas production represent thousands of cubic feet daily.

Cracking plant as seen from distillation unit at Atzcapotzalco.

Tuxpan. The actual capacity of the pipeline, not yet increased, is 22,500 barrels per day. The operating pressure is 400 lbs. psi, but it has been tested to work with slight changes and repairs in the piping at an operating pressure of 800 lbs. The new pumping operations will be based on this pressure.

The larger lines, Poza Rica and Atzcapotzalco, require the pumping of 37,200 daily barrels of stabilized crude and natural gasoline. The pumping facilities of this pipeline will be used, and ultimately there will be ten pumping stations, all of which will use centrifugal pumps, eliminating whenever possible the present system of storage in each terminal and the use of piston pumps. Each station will have three electrically driven pumps; two will take care of the pumping requirements, and the third will be in reserve.

The refinery at Atzcapotzalco, twelve kilometers from the center of Mexico City, was erected originally by the Mexican oil company, "El Aguila" (Shell Oil Co.) with the purpose of supplying the city and its surrounding territory with oil products. At first a Braun plant and a Badger plant, removed from the refinery dismantled at Ciudad Madero, Tampico, were installed. Later, after the refinery had passed into the hands of Petroleos Mexicanos and due to the increasing demand for oil products, both units were enlarged and are operating for the production of automobile gasoline, kerosene, gas oil of different specifications and residual used as fuel in local plants. As Mexico City is not located near coal mines its industry depends almost completely on fuels obtained from oil. The refinery includes facilities for the acid treatment of kerosene and for the sweetening process as well as units and auxiliary equipment to process 22,000 barrels daily of crude and natural gasoline from Poza Rica.

The new facilities installed will process 37,245 barrels of crude and natural gasoline per day for the production of the following by-products:

	Bbls. per Day
100 octane aviation gasoline	1,040
70 octane automobile gasoline	2,000
60 octane automobile gasoline	11,568
Kerosene	620
Fuel oil for domestic furnaces	2,500
Tractoline	1,950
Diesel fuel	1,000
Fuel oil (industrial fuel)	15,230
Liquid gas (domestic use)	696

The units considered for the production of the above mentioned products are the following:

(1) Crude Units: The facilities for primary distillation, especially those concerning control and measuring instruments, will be slightly modified and enlarged, and a new distillation plant will be added to process the surplus.

(2) Fractionation of natural gasoline for the recovery of isobutane and normal butane for isomerization, isopentane and light naphtha (base stock). This unit also will include the copper treatment, licensed by the Phillips Petroleum Company, for direct by-products.

(3) A thermal cracking unit of the Dubbs type will be used to charge flashed crude and a small amount of gas oil. The remainder of the flashed crude will go directly to storage to be used as industrial fuel. There will be facilities also for the concentration of gas for the preparation of the charge of olefins for the alkylation plant. The cracked gasoline will be treated by the processing equipment.

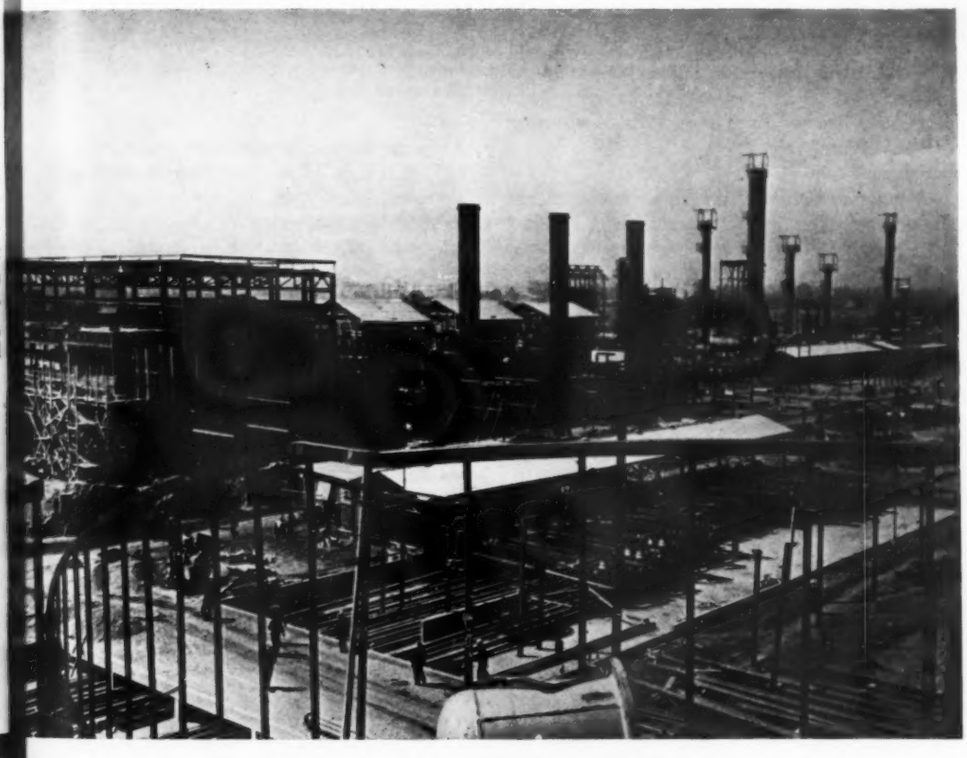
(4) Isomerization of butanes by a unit with a capacity of 500 barrels per day, licensed by the Shell Oil Company, which will be used to supplement the feeding of isobutane into the crude flowing in for alkylation.

(5) The alkylation process with hydrofluoric acid, licensed by the Phillips Petroleum Co., is used to produce the principal mixing agent for the 100 octane aviation gasoline.

(6) Tetraethyl lead mixing plant; present facilities will be used for mixing the ethyl fluid and automobile gasoline. A new mixing plant will be installed for aviation gasoline.

(7) Auxiliary services will include an installation for the generation of electric power using high pressure vapor for the turbines; the escaping vapor will be drawn out at 275 lbs. psi in order to fill the requirements of the different processes. Permutit equipment will be used for the treatment of the boiler feedwater. Fuel gas coming from the same unit will be used in the burners and heaters of the cracking plant. The rest of the refinery, as all other refineries of

Erecting fractionating tower at new Mexican refinery.



Atzcapotzalco power house and boiler plant under construction.

Petroleos Mexicanos, will use fuel oil and vapor. A cooling tower of forced discharge, located at the center, will serve to cool the water coming from the drilled wells in the same area as the refinery.

During the second half of 1945 Petroleos Mexicanos sent to the United States twenty-seven engineers, each specializing in a different phase of the refining industry, to make studies related to the construction and future operation of the refinery. The electrical and mechanical engineers visited manufacturers of pumps, compressors, valves, tubing, towers, complementary equipment and control and measuring instruments. They received practical training at the refineries of the Phillips Petroleum Company at Borger, Texas, and Kansas City. The chemists, chemical engineers and operators also visited manufacturers whose activities could be useful to their project and received practical training in the already mentioned refineries and in others in California, Pennsylvania and Texas. They also practiced in the laboratories of the Phillips Company at Bartlesville, Oklahoma, and elsewhere. The knowledge and experience of the personnel selected for this work plus the additional training received, undoubtedly, will be of great value in the future operation of the refinery.

Besides the erection of plants and the installation of equipment, Pemex is constructing buildings, shops and laboratories, as well as a restaurant that will also serve as club and sports center.

The refinery at Atzcapotzalco will supply with oil products the most densely populated region of the republic, the Federal District and neighboring states. The increase in the consumption of petroleum by-products during recent years has assumed great proportions. Petroleos Mexicanos, the Federal government, and the agencies of publicity and tourism have started campaigns advocating elimination of fuels such as firewood and charcoal, and stressing the advantages of the petroleum fuels. It is estimated that 30 percents of the population that never before used oil fuel has realized its advantages and the demand for liquid gas in cylinders and fuels for stoves is constantly increasing. The great increase in domestic consumption has been caused by many different factors, including the development of numerous industries that use petroleum fuels in their different processes, the expansion of road networks and the substantial growth of cities that is bringing into use a larger number of automobiles and trucks for passengers and freight, the increase in the use of oil powered railroad equipment, and the increasing networks of airlines operated by Mexican and foreign companies.

The changed ratio of domestic to export demand indicates the progress of Mexico during the past few years. Before the war Mexico exported about 75 percent of its total oil production, leaving the remainder for local consumption. At present the situation is reversed and export barely absorbs 25 percent, although it is true that Petroleos Mexicanos encourages export sales and sells to the United States, Central and South America and European countries. It is believed that once maritime traffic returns to normal the demand from abroad for Mexican oil will rise appreciably.

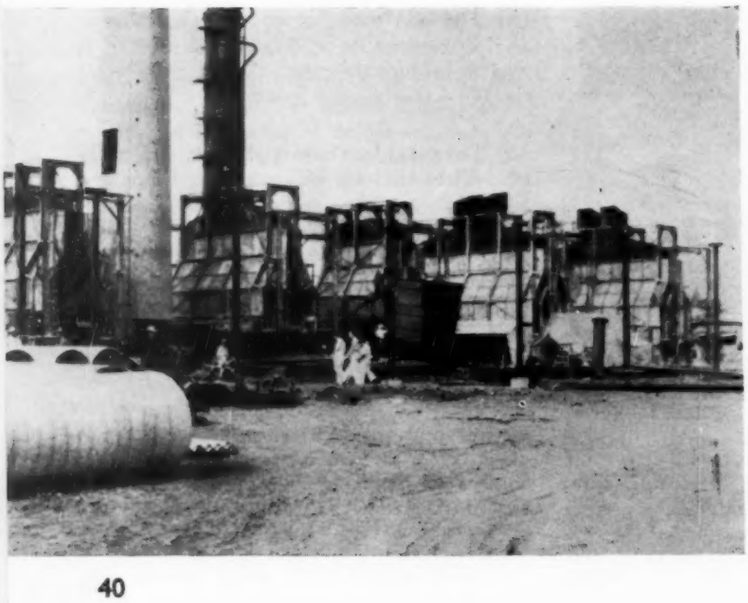
The units included in the enlargement of the Atzcapotzalco refinery are as follows: Primary distillation, 40,000 barrels; thermal cracking, 12,000 ; isomerization, 530; alkylation, 880; fractionation of isobutane and isopentane, 4,800. The power plant includes two turbine generators of 5,000 kw. each and three boilers that will produce 37,500 lbs. of steam per hour. There will be storage capacity for 2,000,000 barrels of oil and its by-products.

The projects planned by Petroleos Mexicanos include five refineries in the republic. The refineries at Mata Redonda, Vera Cruz, near Tampico, and the one at Bellavista, in the same state, will be dismantled. A new refinery will be installed in the state of Guanajaco in the city of Salamanca. This will supply oil products to the central region of the republic, thus facilitating the purveyance to areas at a distance from oil producing centers. The equipment to be used in the erection of this refinery will be principally obtained from the refineries dismantled. The preliminary work has been started at the northeastern part of the city, and although various difficulties have delayed progress it is believed that the refinery will be completed by the middle of 1947. The departments of Production, Construction and Refineries work jointly on this project, and everything related to its design has been left in charge of expert industrial technicians.

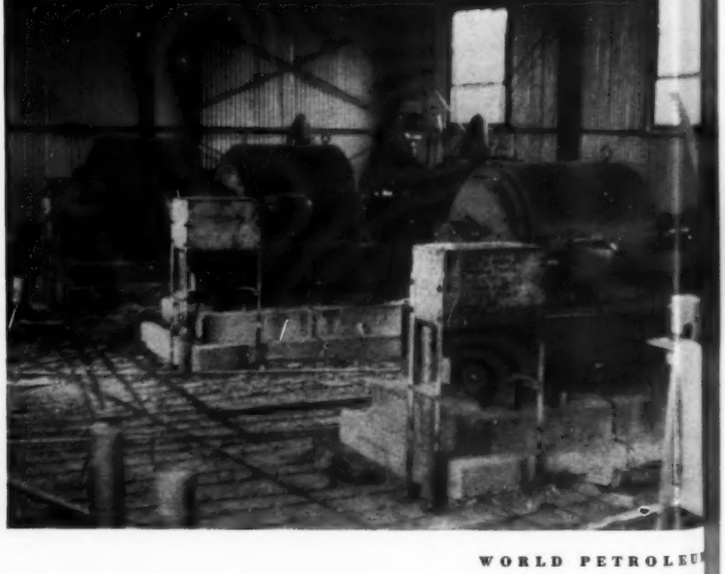
The progress of the different operations has been delayed by causes beyond control of the company and the builders, and completion of the refinery at Atzcapotzalco before the end of the year is considered impossible. Construction at Poza Rica likewise has been delayed and its completion is expected simultaneously with that at Atzcapotzalco.

Through the efforts of private organizations, the Oil Workers Union and the management of Petroleos Mexicanos, first steps have been taken to offer Mexican youth an apportunity for training as oil technicians. It is planned to establish a Technical Institute of Petroleum in Ciudad Madero, near Tampico. The aim of this institute will be to provide the opportunity of obtaining technical training without leaving the country. Heretofore students seeking instruction in petroleum engineering has to go to a foreign country to obtain it. The Board has obtained 100,000 pesos ($20,000) for the construction of the institute building.

Battery of heaters at Poza Rica refinery.



Motor driven centrifugal pumps being installed on pipeline from Poza Rica field to Mexico City.



Lobitos Oilfields Ltd. refinery at Ellesmere Port on the Manchester ship channel. Photograph courtesy The General Electric Co. Ltd.

BRITISH REFINING ADJUSTING TO PEACETIME DEMANDS

By ALEC H. DAY

REACTIONS of the British refining industry to the impact of war were two-fold, consisting of a service cut in production and simultaneous concentration of the capacity still in use on providing products most urgently required for military purposes. New refinery construction, where it was taken in hand, was closely linked-up with the latter objective.

Slackening of refinery activity was reflected on Britain's import figures during the earlier war years. Total imports of all petroleum rose by nearly 25 percent between 1938 and 1943, but this expansion was more than accounted for by a great increase in imports of refined products. Inward shipments of crude fell during the same period by 75 percent, and imports of all refinery feedstocks, including crude, by about 50 percent.

Like other war-time economic changes in Britain, the cut in refining was made under the compulsion of war needs. Most pressing of these was the necessity of saving shipping space. Since refining, including fuel consumption, involves a loss of crude running up to 15 percent, imports of products instead of refinery feedstocks meant a saving in tanker space too large to be relinquished under war-time shipping conditions. Another factor in the reduction of British refining activity was the desire to economize labor.

Aggregate of refinery operations was reduced by the closing down of some plants altogether, and the operation of others at much below capacity. Closed plants made their contribution to the war effort through their extensive use for storage and kindred purposes. Plants left working were engaged largely on the production of lubricating oil from imported bases. This policy was dictated by the general shortage of lubricants among the Allied nations.

Changes at the Anglo-Iranian Oil Company's two largest plants in Britain provided an example of the general course of events. Refining at the 7,500-bbl. a day plant at Grangemouth, where normal output consists only of major products, ceased altogether, and the plant was used as a storage centre. The company's Llandarcy refinery, which is a more specialized plant, continued in operation, but with a big reduction in throughput. Although this plant also has a capacity of around 7,500 bbl. a day, its output was down at one time to 1,250 bbl. daily, consisting almost exclusively of lubricating oils. Both these plants have recently been in course of resuming their normal operations.

Britain's most important refinery construction of the war was the special aviation spirit refinery at Heysham, Lancashire. Planning and research work of this kind started well before 1939, and actual work on the site began as war started. This government-owned plant, covering 300 acres, was operated through "Trimpell" Limited, a title signifying the cooperation of Trinidad Leaseholds, Imperial Chemical Industries, and the Shell organization in the management of the refinery and supply of materials.

The "Trimpell" plant employed the destructive hydrogenation process for treating selected gas oil feedstock to produce high quality aviation base stock. This process also gave butane, which was dehydrogenated to produce butylenes and, after polymerization and hydrogenation, gave iso-octane for blending with the base stock. Iso-octanes produced by Shell's plant at Stanlow, and components from the I.C.I. hydrogenation plant at Billingham, were also used.

Two novel features of the "Trimpell" refinery were the high degree to which automatic control was developed, and the special lay-out, such as the duplication of all major processes, to protect production of vital war supplies from enemy air attack. The plant was mainly responsible for Britain's production of aviation spirit, which reached a rate of 12,500 barrels daily and included a large proportion of the super-fighter fuel "150 grade."

After operating below capacity since the war, the plant was closed down at the end of June, 1946. As it is a government-owned concern, any decision as to its future employment will rest with the authorities. Operation of the plant filled an

essential military need while war lasted, but any civil demand for aviation spirit on the scale it was produced at Heysham for fuelling continuous bombing raids from Britain is not in sight.

Participation in the "Trimpell" project was only one of several wartime refinery developments with which the Shell organization was concerned. Work on a large scale aviation spirit plant at Thornton, in the Chester area, was started before the outbreak of war, and was one of Britain's big "hush-hush" provisions against likely military requirements, but this project was abandoned after the fall of France in 1940, when the impossibility of obtaining adequate supplies of steel and other constructional material was foreseen.

Geographical conditions tended to concentrate Shell's new refinery developments during the war at the important plant already existing at Stanlow, Cheshire. Shell Haven refinery on the Thames estuary was obviously too vulnerable to air attack to be suitable for extension. The ocean storage was to a large extent unemployed during the early war years, owing to the diversion of imports to West Coast ports, but the processing plant worked to capacity except for a short period during the Battle of Britain. Shell's other important refinery at Ardrossan, on the Firth of Clyde, was inconveniently situated to fit into wartime distribution schemes.

Developments at Stanlow began before the war with an iso-octane plant, started in 1938 and brought into operation in 1939. This plant subsequently supplied components for the "Trimpell" plant at Heysham. Its completion was followed by the installation of two lubricating oil plants employing solvent-extraction, one designed to produce heavy oil for aircraft by the Duo-sol process and the other for production of Diesel lubricating oil and the whole range of industrial lubricants, including transformer oils and technical and medicinal white oils. This group of extensions became operative in 1941-42.

War-time developments at other Shell plants included doubling the Manchester grease plant in 1940. This plant provided large quantities of waterproofing grease for the American and British forces. Experience gained there was drawn on extensively by the United States authorities before undertaking similar work themselves, and made a considerable contribution to the successful waterproofing of vessels used in the "D-Day" invasion of France.

Fawley refinery on Southampton Water, owned by Agwi Petroleum Company (New Jersey Standard), and designed for all products except lubricants, was among those situated in the areas particularly liable to air attack. Furthermore, the naval authorities would not permit ships to call at this centre. Under the general refining policy, therefore, operations were reduced soon after the outbreak of war, and the plant was shut down early in 1943.

This plant is now operating at its 14,000 bbl. daily capacity, having started up late in 1945, output now consisting of all products, according to marketing requirements, with the exception of asphalt. No definite plans have been made for expansion, but the geographical position of this refinery suggests the possibility of its ultimately becoming a more important factor in petroleum distribution.

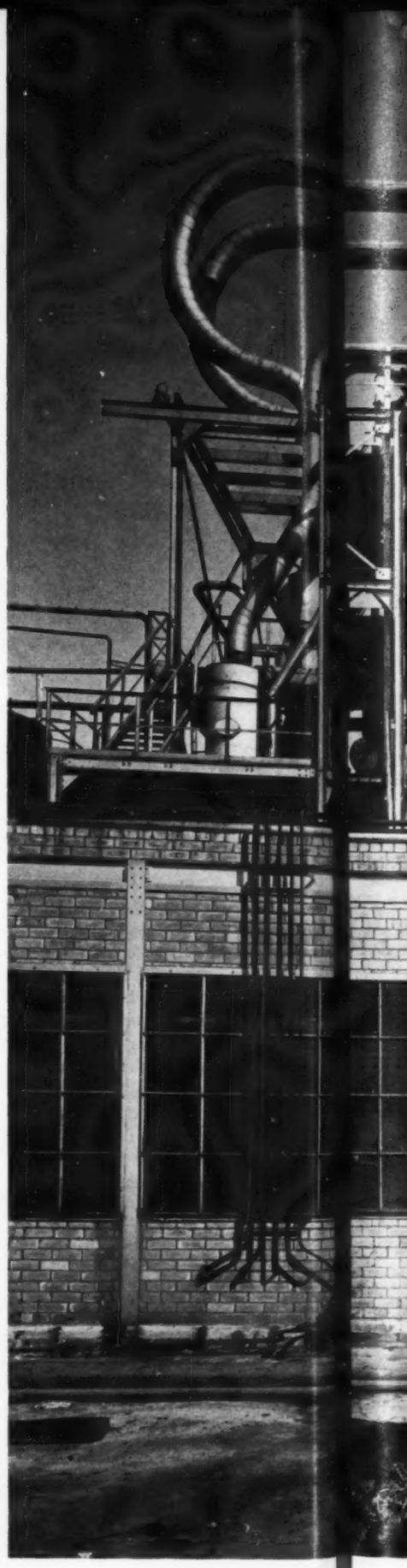
At the outbreak of war the plant of Manchester Oil Refineries consisted of a high vacuum distillation unit with a potential throughput of 3250 bbl. a day, an improved type of solvent-treating and de-waxing plant with an annual capacity of 40,000 tons and a chemical treatment section, comprising acid treating, contact clay and filtration plants with a capacity of 60,000 tons a year.

War-time extensions included construction of a considerably improved chemical treatment plant of the most modern design. Incorporated in the new layout was an enlarged white oil section. In addition, equipment for the production of petroleum sulphonates was included, with an alcohol recovery plant. A more detailed account of developments at this refinery appears on other pages of this issue.

Since the end of the war the refining industry in Britain has been re-converting to operation on something like pre-war lines. Closed plants have been resuming work, and those engaged on war-needed products have been getting back to peace-time output, which, in the great majority of cases, does not involve a great deal of adjustment. Re-conversion and restarting of plants has naturally turned the attention of oil men to the future of the refining industry, the outlet for which is much the same as before the war, except that there is for the moment only one customer—the government—instead of the many previous buyers of finished products.

A large part of Britain's total refinery capacity consists of specialized plants, using bases other than crude, and producing lubricating oils, white spirit and other special products for which there is a great diversity of demand. One possibility is that the development of the refining industry on these lines will be carried further, with the future output comprising mainly those manufactures which, owing to the necessity for special packing or for other reasons, are the most inconvenient and costly to bring in from abroad. An advantage of such development would be the relatively high prices which products of this type may command in the home market.

Consideration of this aspect of refining has revived discussion of the general possibilities of home refining on a greatly increased scale with crude as a base. The main benefit claimed for such expansion is that the importing of cheaper crude instead of more expensive products would achieve a definite saving of foreign exchange.



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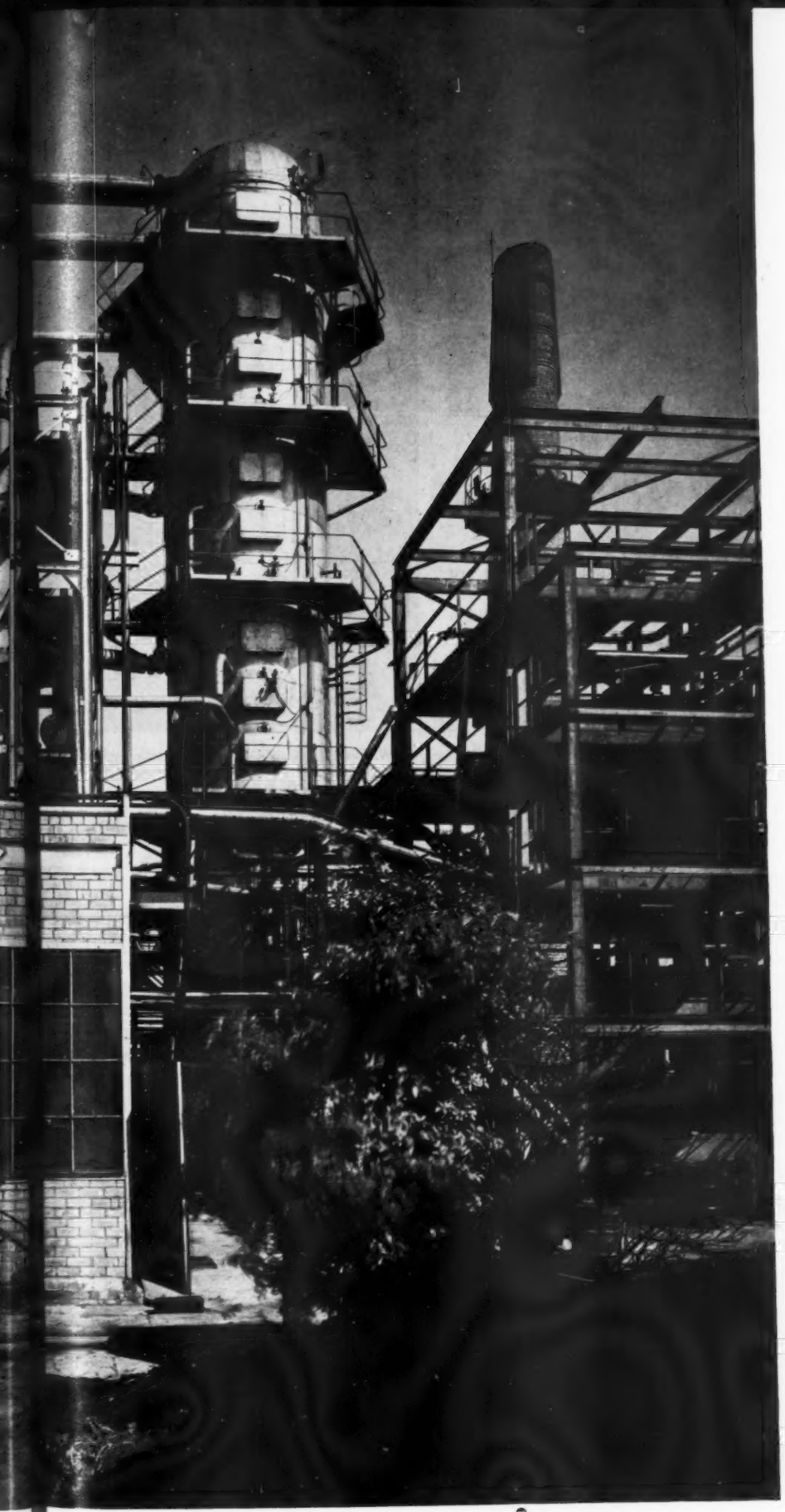


nd fr[illegible]nt at the greatly expanded Manchester Oil Refinery Ltd. plant at Trafford Park, Manchester.

This view of refining policy has been given additional prominence by Britain's present shortage of dollars. The argument runs that the crude supply and refining capacity of sterling countries as a whole are insufficient to supply the sterling market, and that some part of the aggregate crude must therefore be imported from dollar sources in any event. Crude imports are thus held to be more profitable, since every dollar's worth of crude might be made to produce the equivalent of $1.50 or much more, of finished products.

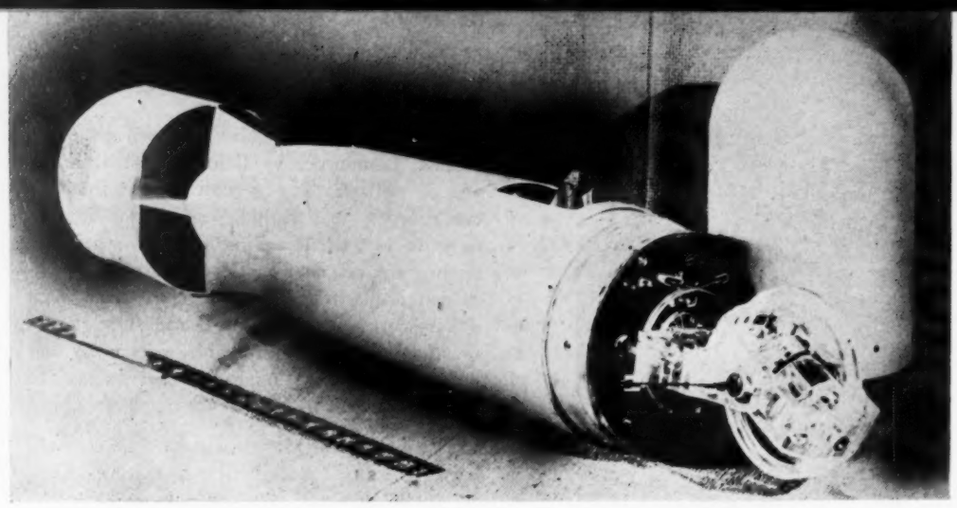
Another advantage claimed for domestic refining is that by importing more crude the industry would employ additional British labor. This additional employment might not amount to much owing to the small number of workers required in refining in relation to the size of plant and the importance of output.

Opposition to the home refining theory is based mainly on the belief that integrated companies with world-wide sources of supply, and world-wire markets, are best able to provide just the needed type and quantity of any finished product required in any market at any time. To the advantages claimed for this flexibility of international supply is added a saving of tanker space if refined products are brought into the country, and also the low cost of refining in producing countries, where fuel is cheap.

Another argument advanced in this connection is that, from the British angle, an expansion of refining would in the first place mean refinery construction, which could only involve a loss of exchange. Even if some refinery parts did not have to be imported, labor and material used in putting up new refineries would otherwise be available for use in export industries, and would thus earn foreign exchange. Initial losses of exchange through refinery construction undertaken at the present time would naturally fall on Britain just at the time of the greatest shortage of dollars and man-power.

In practice, refining abroad is probably the sounder economic policy from the viewpoint of the British consumer, although the shortage of dollars justifies the fullest and most profitable use of the country's existing refining potential.

The question of refining in Britain links up at one end with the sources of future supply, and at the other with the possibility of supplying other countries, to a greater extent than before the war, with finished products from British refineries. These problems may safely be left to the petroleum industry itself, which has so far provided a complete range of products in Britain at reasonable prices. The war-time performance of refining and other functions of oil supply justifies the expectation that existing war-time restriction and "pooling" will be removed as soon as possible, giving the oil industry scope for providing its former service of refined products to the British consumer.



Streamlined "bird" with nose removed to show gimbal mechanism which orients device in flight.

FLYING EYE FOR OIL EXPLORATION

ONE of the top secret devices that proved of great value in overcoming the enemy submarine menace during the war offers attractive possibilities for peacetime use in oil exploration. This became known early in June when the Navy permitted the public to learn some details regarding MAD which in translation is the Magnetic Airborne Detector. In simplest terms it is a magnetometer which in the anti-submarine campaign was towed by cable behind an airplane and was able to detect the presence of U-boats too deeply submerged to be located by visual means.

This adaptation of an instrument that has long been used in oil and mineral surveys goes back to 1940 when studies on its use over water or difficult terrain were carried on in the research laboratories of Gulf Oil Corporation. When war drew near its possibilities for submarine detection were brought to the attention of the government which granted Gulf a contract for its development. The first submarine hunting model went into operation in the month of Pearl Harbor, 1941.

Built around a sensitive magnetic detector to record for the geologist the intensity of the earth's magnetic field, the war magnetometer was adjusted to signal the presence of a submarine by indicating a disturbance in its field. Not a long range instrument, it was flown low from blimps and planes. Rushed into production by the originating scientists themselves, the first supply of instruments was delivered to the Navy in time to help in the grim submarine battle of the Atlantic in 1942.

Airborne magnetometers were also developed jointly by the Naval Ordnance Laboratory and the Bell Telephone Laboratories, under the auspices of Navy's Bureau of Ordnance and Bureau of Aeronautics, and by the Airborne Instrument Laboratory of Columbia University's Division of War Research under the auspices of the National Defense Research Committee. As a result of all these activities, hundreds of airborne magnetometers flowed from the production lines of manufacturers, helping to protect convoys in the North African expedition, combing the seas during the invasion of Normandy and tracing U-boats in all theaters.

Ground magnetometers were widely used in early oil prospecting. By inferring the position of the highly magnetized basement, or igneous rock, they gave oil geologists considerable information about the oil-bearing formations lying above the basement. In the thirties, however, the magnetometer was largely superseded by more accurate gravimeter and seismographic survey procedures.

Now adapted for use in flight the usefulness of the magnetometer broadens tremendously. The earlier ground instrument had to be mounted on a solid platform, because of its easily disturbed sensitivity. Until Gulf's development none had been devised suitable for use in a moving vehicle, let alone aircraft.

In a matter of years this "flying eye" may permit the rapid survey of regions that would require decades by foot expedition. Unpromising areas can be eliminated, and the more accurately diagnostic geophysical prospecting methods can be concentrated in regions of high probability. In preliminary surveys it gives a continuous magnetic chart, in grid style, over hundreds of miles of terrain in a few hours and is the fastest known means of securing geophysical data.

E. W. Westrick, Gulf Oil Corp. research engineer, who helped develop the airborne magnetometer.

Of all means of geophysical prospecting, it alone provides a continuous record of territory surveyed. It also offers the only means of magnetic mapping over areas where erratic surface magnetic influences make ground readings unusable. As the only method of magnetic prospecting over water, it opens vast unexplored stretches to the oil geologist. Its first job for Gulf will be in flying off-shore in the Bahamas.

The present instrument, which is electronically operated, rides in a bomb-like casing, called a "bird," trailed beneath the plane to eliminate magnetic interference. It is reported that the Navy may use the device in making a survey of Naval reserve No. 4 in northern Alaska.

Military training plane AT-11 with airborne magnetometer trailing.

VALIDITY OF DATA FROM AIRBORNE MAGNETOMETER

By Homer Jensen*

MAGNETIC airborne detectors (MAD) were developed for submarine detection in World War II by a number of agencies under the auspices of the Navy's Bureau of Aeronautics and Bureau of Ordnance. One of these detectors, the AN/ASQ-3A, developed by the Naval Ordnance Laboratory and the Bell Telephone Laboratories, was selected on the basis of sensitivity and stability as most suitable for modification for geophysical prospecting use. The present paper concerns points of difference between surveys conducted by the airborne magnetometer and those conducted conventionally on the ground.

The magnetic airborne detector marks such a dramatic advance in geophysical measurements that some question will arise as to the reliability and utility of data obtained by this instrument. This paper will discuss these matters on the basis of experience with the Naval Ordnance Laboratories-Bell telephone Laboratories instrument, in the surveys conducted by the Geological Survey—Department of the Interior, under the direction of Naval Petroleum Reserves. In addition to the spectacular rapidity and economy of the new method, the points of difference between the two types of instruments resolve themselves in favor of the aerial instrument. (It has been estimated the survey in the Adirondacks, completed in two months, would have taken the same men 27 years by conventional methods.)

The most important gain in results is in the achieving of continuous records. The continuity of traverse permits the examination of the actual shape of the curves, rather than of values interpolated from separate readings; it permits mechanical transcribing of data from record chart to corrected traverse to final contour map, with no loss of detail or alteration of even the subtlest inflection; it greatly simplifies the correction for drift and diurnal variation; it permits the identification of and correction for extraneous signals; it gives validity to all the points on each traverse and it assures the registering of actual peak and trough values on every curve.

Magnetometer operator seated at control box of Naval Ordnance Laboratory—Bell Telephone Laboratories airborne magnetometer installed in PBY plane. U. S. Navy Photograph.

A second important gain is in the attenuation of small anomalies from non-geologic or misleading geological sources. Magnetic boulders, fences, water pipes, stray pieces of metal, and such objects, any one of which might cause a ground station to register false values, all attenuate so that they cause no effect at a few hundred feet of altitude. Larger false signals, from bridges, water tanks, railroad and other metallic structures still register at a considerable altitude, but in nearly every case they can be recognized in relation to their source. It should be remembered in this regard that in conventional measurements, there is no way of knowing the extent of an anomaly; so that in practice magnetic values must be interpolated over the whole distance between two successive stations, even though, as shown by the aerial method, the extent of the anomalous field may be only a fraction of the station distance.

A disturbing factor in some areas where the difficulties of terrain prevent cross-country travel and confine operations to streams or stream-beds, is the presence of lenses of magnetic sands whose signals will often obscure the major geological fields. This problem is completely solved by the airborne magnetometer, for the small signals will either attenuate to such an extent as to disappear from the record, or will be so obviously related to the terrain as to be recognized.

Drift and diurnal variations affect the airborne magnetometer as they do any other geophysical device, but the rapidity of survey is such that their correction is a relatively simple matter. In practice to date, base lines are run intersecting all the traverse lines of a survey and repeated until the values are known very closely. Then all intersecting survey lines are tied to the values established at their intersections with the base lines, and linearly interpolated for corrections of errors occurring between ties to the base lines. A typical survey pattern will have no traverse extent for a longer period than minutes between checks. A self-consistent map of great accuracy is achieved in spite of drift or diurnal variations.

It should be noted that the instrument used is not, as presently designed, a precise instrument for the measurement of absolute field. It cannot accurately establish the absolute value of field at a given point with any high degree of accuracy, but it can start at a measured or arbitrary value, and, by the use of careful survey procedures, establish within exceedingly fine limits the values of all other points within a given area. Since magnetic analysis does not, in general, demand a precise value for the absolute base level of magnetic map, little information of value is lost. Where absolute field is required it can be measured by other instruments and used as a base for the values of the aerial magnetometer.

The instrument which has been used in the surveys made to this time has two frequency characteristics which have little effect on the measurements of large, low-gradient anomalies associated with oil structures, but which require correction in the measurement of the small, high-gradient anomalies which are associated with mineral surveys. There is a lag in response which will displace the signals along the traverse line, causing waving contours unless corrected and there is a non-linear frequency response which attenuates the small anomalies that show up as high-frequency signals on the magnetic tape. Exact analyses of these points have not been made, but it is known that a few simple changes in the instrument can further improve these characteristics.

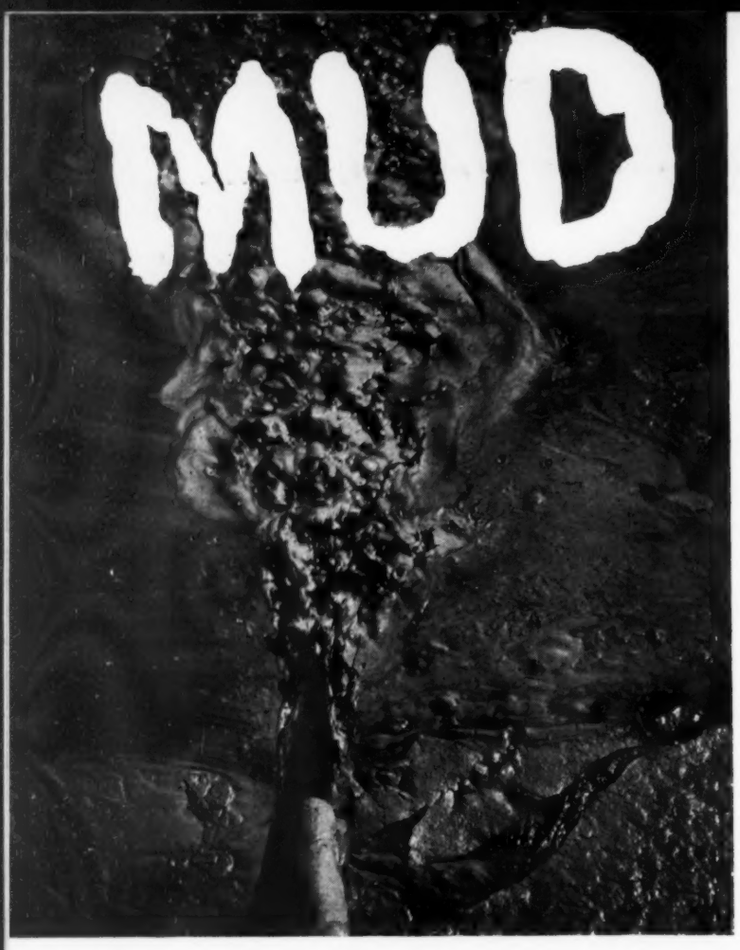
Position control is rather crucial in the making of magnetic maps. The policy which has been followed in our tests is to control the flying of the line to fairly broad limits, but to record the actual line flown to very close limits. Special camera devices and techniques associated with radio devices such as Shoran, have been developed to give continuous high-accuracy records of flight paths. Similarly, recording radio-altimeters have been adapted and incorporated in the survey equipment, so that the position of the plane can be computed within the limits of a 100-foot cube at any point on the magnetic record.

It should be noted that altitude control in magnetic measurements is not nearly as precise a matter as is required in gravity measurements, and that a fifty-foot variation in altitude will not measurably affect results in the low-gradient fields encountered in petroleum prospecting.

Where measurements are made at a number of altitudes, to aid in computations regarding the magnetic source, the altitudes have to be chosen with the expected gradients in mind. Mineral measurements have been made on 300, 600, and 900-foot levels and petroleum investigations at 1000, 5000 and 14,000 feet. Experience has indicated that 1000 feet is a satisfactory principal level for most oil work.

It may be stated in summary that in all except the most detailed of magnetic measurements, involving traverse intervals of only a few feet, the airborne magnetometer will provide data of greater accuracy than can be provided by ground measurements, and that the information derived from air measurements will be more closely related to the geology being studied.

* Naval Ordnance Laboratory and Aero Service Corp.



Mud pit photo courtesy Shell Oil Co., Inc.

ENGINEERING IN M

THE science (or art) of mud engineering came in with the rotary method of drilling well-holes in the oil industry. This is usually dated from the time of opening the Spindle Top field in Texas in 1904. Mud engineering therefore has behind it a history of some 45 years, during which time it has been the object of an enormous amount of study, investigation and research that have resulted in the accumulation of a vast amount of information, which is still being added to.

Notwithstanding the assiduity with which the petroleum engineers and chemists have addressed themselves to the study of drilling mud, the use of this invaluable aid to rotary drilling is still more of an art than a science. This is because of the great variability of the circumstances that are found in the geological formations in which oil wells are drilled. Every oil well, or at least every group of oil wells that are sunk in the same homogenous structure or section, is a law unto itself. The chemical and mineralogical compositions of these formations will often be radically different one from the other, and the same is or may be true of the ground waters encountered in the formation; and these varying circumstances may and do dictate the character of the drilling fluid to be used. That is to say, every well or homologous group of drill-holes must be furnished with a drilling fluid of a specific character adapted to the circumstances of the location, and its composition must often be changed to meet new situations as the drill sinks deeper into the earth.

There is thus no such thing as a universal drilling mud. The most investigators and researchers have been able to do has been to draw up a list of the properties which a good drilling mud should possess; that is, the things a mud should be capable of doing in any given situation. With a clear idea of what are the desirable properties of a mud, the task then becomes one of synthesizing a mud that will come the closest possible to the ideal.

Essentials of a Good Mud

Reduced to the lowest terms, a drilling mud must do just two things: carry the rock cuttings made by the drill out of the hole, and supply a back-pressure that will prevent the collapse of the wall of the drill-hole. To perform these two indispensable functions in the most convenient way a good drilling mud should have these qualifications:

The lowest fluid viscosity that is consistent with a satisfactory capacity for carrying cuttings through the mud pump.

When charged with weighting material (barite, etc.), the mud should keep this material in a stable suspension even in muds weighing up to 15 or more pounds per gallon.

A drilling mud should have a high degree of thixotropy; that is, when the mud pump is shut down and mud should thicken so that the cuttings will be largely kept from settling out until the pump can be started again.

The mud must have a "good filtering property;" that is, it should form only a thin, tough coat on the wall of the hole; this mud-coat should allow as little as possible of the liquid of the mud to seep into the formation.

The mud should retain its suspending power at the temperatures usually encountered in drilling. The suspension-stability of the mud should be highly resistant to electrolytes (salts and alkalies).

It should also resist changes in its composition due to chemical or bacterial action.

Its fluid portion should have a character such that it will prevent, or at least retard, the swelling of hydratable materials (bentonitic clays and "heaving" shales).

Besides that, it should have a low initial cost, and involve little expense for keeping it in order. Mud engineers are quite generally agreed on the above list of the points of a "good" mud; and when progress in drilling muds is spoken of, it is understood that ways and means have been found to improve the filtering characteristics of a drilling fluid, or its suspensive power, its stability, its resistance to temperature and electrolytes, and its anti-hydrating power as regards clays and shales.

The circulating medium used by the first rotary drillers consisted merely of the ground-up detritus produced by the mechanical action of the drill on the native rocks, clays and sands encountered in the hole. This nondescript fluid was more or less satisfactory for removing cuttings from shallow holes, but it was soon perceived that drilling fluids have other very important functions. One of these is to supply a back-pressure to prevent caving of the hole, and this meant that the mud must have a specific gravity somewhat near the specific gravity of the material of the wall of the hole. It was found that the weight of the mud (per gallon) could be increased by the addition of certain heavy minerals in a finely powdered condition; the most practical among such weighting materials is the mineral barite, which is now in universal use for the purpose.

Addition of weighting material was perhaps the first stage in the evolution of a synthetic drilling mud. But there quickly followed a realization that means would have to be found to keep the heavy material from settling out. The native mud produced from the minerals ground up by the drill might or might not be of a character that would keep the barite in suspension. After much experience it was found that bentonitic clays have the property of giving an ordinary mud a "gel-like" character of sufficient strength to keep the weighting material in suspension;

and from that day to this the record of drilling mud improvement has consisted in the discovery and selection of substances that when added to a drilling mud would improve its filter-caking property and its viscosity.

Water-Base Muds

Modern drilling practice has developed two general types of drilling fluids known respectively as water-base muds and oil-base muds.

The most commonly used are the water-base muds, of which there are three main types: clay fresh-water-base muds, muds with a base of some organic colloids, and emulsion muds compounded from water-base and oil-base mud.

Muds with a base of clay in fresh water are most commonly used for ordinary drilling and completion practice. In making up these clay muds the driller may have a wide choice of clays found in his vicinity, provided he informs himself as to their physical properties such as filter loss, thixotropy and viscosity. If these properties are not altogether satisfactory he may blend these native clays with bentonite from one or another source, and further improve them by treatment with chemicals and heat.

There is, in general, a limit to the extent to which the desirable properties of thixotropy, viscosity, filtering loss and filter-cake strength may be conferred on a clay or bentonite-base mud by addition of chemicals and other treatments. This limit on the qualities of natural clay minerals has lately been expanded by use of certain organic colloids along with the conventional ingredients; these organic colloids include Karaya gum and especially a form of colloidal starch that is dispersible in water. These organic additives have proved especially valuable in that they tend to protect the colloidal clay caustituents of the mud from the coagulating action of salty water, alkaline cement and other materials which have the effect of depreciating the suspending and thixotropic qualities of clay suspensions.

Prominent among the starch components of drilling muds is a modified starch which is now extensively manufactured and sold under the name of "impermex." The value of this ingredient lies in the fact that by its use the mud engineer may compound muds with lower filter-loss characteristics than can be done with most of the chemicals and treatments that have heretofore been used to keep the clay colloids in prime condition. Besides allowing a drilling mud to be prepared that will show a low filter-loss characteristic and a thin and readily detachable filter cake, the fact that a mud compounded with modified starch is resistant to salt water up to about 5000 grains per gallon is now recognized to be of prime importance. It often makes a difference whether the water that filters through the mud cake on the hole-wall is fresh and salty. In the former case the fresh water will tend to hydrate the clay materials in the productive formations, thus reducing their permeability. This hydrating effect is considerably less with salty filtrates.

With a mud containing a fixed proportion of native clay base, nearly any desired rate of water loss through the cake can be established by decreasing the amount of added bentonite and increasing the amount of impermex.

Modified starch added to a drilling mud is subject to bacterial fermentation, and hence for prolonged use must be treated with a preservative, or otherwise sterilized. Either a commercial disinfectant may be used, or the pH of the drilling mud may be maintained within the range of 11.5 to 12.5—that is, distinctly alkaline. For drilling through barren sections of the formations it is usually more convenient to use a disinfectant, but when drilling in productive zones it is to some extent preferable to rely on a high pH; in that case, after completion and washing, the starch in the remaining wall-cake will ferment and disintegrate more readily. Caustic soda or hydrated lime are used to maintain mud at the desired pH.

Carboxy-Methyl-Cellulose Mud

Besides modified starch there has recently been developed another organic colloid for use in drilling muds in the form of the sodium salt of carboxy-methyl-cellulose lately described by H. H. Kaveler (Phillips Petroleum Company) before the Mid-Continent Division of Production of the API. This substance is prepared by soaking a cellulosic material (cotton, wood pulp) in a 40 percent aqueous solution of caustic soda, and treating the reaction mass with mono-chloracetic acid. The resulting product is a colloid which is readily dispersible in water.

One of the outstanding characteristics which sodium carboxy-methyl-cellulose presents to the drilling-mud compounder is its power to impart high viscosity to water solutions. Another outstanding characteristic is that its water solution possesses heat stability, and even with temperatures as high as 212°F. the solution shows only a very slight reduction of viscosity. It is not affected by the salts found in ordinary formation waters, and is affected by calcium chloride only when the latter is highly concentrated. This is of much importance when the drilling mud may be contaminated by anhydrite and cement.

The general properties of sodium carboxy-methyl-cellulose as verified by the standard test procedures of the API code 29 are as follows:

Water losses in the standard filter press test are in the range of 3 to 4 cc. in 30 minutes and this range is consistently maintained. Filter-cake thicknesses are consistently in the range of 2/64" to 3/64".

Although sodium carboxy-methyl-cellulose markedly increases the viscosity of pure water, the increase of viscosity of the prepared mud is not excessive, and may even be reduced, depending somewhat on the quantity of bentonic and non-bentonic types of clays present in the mud, and viscosity is subject to control even when the the salt content is high.

Low gel strengths are consistently obtained and maintained, depending on the type and quantity of clay present. However, with any mud it is possible to maintain 10 minute gel strengths in the range of 20 to 40 grams if the salt concentrations are less than 75,000 ppm.

Sodium carboxyl-methyl-cellulose has a remarkable ability to stabilize drilling muds in the presence of even high concentrations of soluble salt, that is, the mud becomes truly salt resistant.

The good qualities of this mud component, as listed above from laboratory tests, have been verified in field experience. Its use is said to have permitted substantial reductions in direct mud costs and indirect savings in drilling and completion costs, and it is said that sodium carboxy-methyl-cellulose possesses superior properties to either starch or gum in the compounding of salt resistant drilling muds. It is not fermentable, and does not require maintenance of high pH.

Adding weighting ingredients at Carter Oil Company deep test, McClain County, Okla.

since its range is any point above 7.5, and it is stable at all temperatures encountered in drilling.

Tests show that bentonite and bentonitic minerals have little tendency to swell in contact with water dispersions of sodium carboxy-methyl-cellulose. In fact, if moderate quantities of salt are present in solution with the carboxy-methyl-cellulose the tendency of bentonitic minerals to swell in water is almost completely suppressed. This should be of interest in drilling through "heaving" shale.

Selection of a Drilling Mud

The choice of water-base drilling mud for a given drilling job is dictated in the first place by the general requirement that the mud cake formed on the wall of the hole shall be as thin and as tough as possible, and permit only a minimum amount of filtrate to pass into the formations. An excess of mud cake left on the walls of the hole in productive zones may obstruct the flow of oil or gas into the liners, and must be thoroughly scrubbed off. The clean-off is easier if the mud fluid is compounded so that the mud cake contains relatively more water than solids. It is essential that the drilling mud be resistant to flocculation by electrolytes so as to produce a protective mud cake that is comparatively immune to cement, for instance. This points to the necessity of using the organic colloids heretofore mentioned, which are more stable and more resistant to flocculation than the clay colloids.

Since it is inevitable that some of the water or watery component of the drilling fluid will filter through the mud cake into the formation, the possible effect of this filtrate should be taken into consideration. Many oil sands contain more or less of clay or clay-like minerals which are hydratable, that is, are capable of swelling on contact with fresh water.

In this swelling, these clay particles expand and thereby obstruct, more or less seriously, the channels through which the oil or gas should flow. On the other hand, it has been found that many sand cores show a greater permeability to solutions of salt than to fresh water, and there is a more or less general tendency for permeability to increase as the salt content increases. The expansion of clay material in an unconsolidated sand is accompanied by a development of pressure which promotes the movement of sand toward the well hole and the formation of a tight barrier between the sand body and the liner.

These considerations point up the necessity of keeping down the rate of fluid loss through the mud cake so as to reduce the radius within which the clay material of the sand will be subject to hydration. They also indicate the wisdom of using a salty water in compounding the mud, especially where laboratory tests show that the permeability of the sand to salt water is greater than to fresh water. It is generally agreed that clays used in making up the mud should first be thoroughly hydrated before use, otherwise the clay particles in contact with the hole wall will become hydrated and block the flow channels, and require severe scraping to remove them.

The effect of the type of mud used on the results of subsequent electrical logging of the well should be taken into consideration. For instance, logs made in the presence of an ordinary clay mud may show differences from a log made in the presence of a mud containing organic colloids. It is not difficult to correlate logs made in the presence of various clay muds, but it seems that easy interpretation of formation characteristics such as texture, fluid content and relative permeability in the presence of an organic colloid mud awaits the accumulation of more experience with these muds.

Fresh water clay-base muds and cement are more or less incompatible, that is, are mutually harmful and usually require separation by a water slug. Modified starch muds and sodium carboxy-methyl-cellulose muds can be made relatively immune to cement by alkalizing with hydrated lime or cement. On the other hand, when these muds are made with salt water they tend to thicken the cement slurry and hasten setting time.

As outlined above, water-base drilling muds have the disadvantage that they allow a certain amount of their water or salt solution to filter through the mud cake into the rock formations. This loss of filtrate is of no great consequence in the barren sections of the hole, but it may become serious if the result of the seepage is to hydrate the clay minerals in a productive sand so as to restrict if not to block the flow of oil or gas into the well. This objection is particularly relevant to oil sands where the formation pressure is low, where, even in the absence of hydration, any considerable amount of water would block the free flow of oil.

Oil-Base Mud

The fact is that there are numerous situations where it is desirable to have a drilling mud or fluid containing no water at all. This need has been met by compounding an oil-base mud, which usually consists of a vegetable oil, a saponifying agent, and a light-refined or crude-oil diluent. Such an oil-base can be compounded at the well to conform to any viscosity and to weights of up to 20 pounds a gallon.

Oil-base muds first came into use shortly before

Sponsor Mud Research

The American Association of Oilwell Drilling Contractors has voted $6,000 to the University of Texas for research and for training courses in the use and control of drilling fluids. Courses will be offered in most areas where mud is a problem.

Modern ingredients produce drilling muds of any desire

World War II; not much progress was made during the war, but lately its use has been undergoing a large expansion. Various ready-made preparations of oil-base are now on the market, including a product developed by the Shell Research and Development Co. which is being distributed in tank cars and trucks by Halliburton Oil Well Cementing Co. Another product is put out by Oil Base, Inc., in a form which can be shipped in 100 lb. bags.

A principal use of oil-base mud is in completion work. In such cases the hole is drilled down to the productive sand with water-base mud; casing is set and cemented, and the hole completed in the oil-sand with oil-base drilling fluid. When oil-base mud is thus used no water is lost to the sand, no clay minerals in the sand are hydrated and the formation remains open. A well completed in this matter usually comes in without shooting, swabbing or scraping, whereas when completing with water-base mud the sand may become waterlogged; a considerable time would be required for completion with swabbing or shooting, or both.

G. V. Kersten (Western Gulf Oil Co.) has lately reported field experience with fields where the sands contain variable amounts of hydratable minerals of varying permeability. In every such field where sufficient data was collected it is evident that completion with an oil-base mud has resulted in an increased initial flow of oil in comparison with wells completed with water-base mud. The increases noted by Kersten are important enough to make it imperative to substantiate this benefit from oil-base muds by collecting more records of such comparisons.

In general, oil-base mud is not regarded as a universal substitute for water-base mud. The latter, being cheaper and more easy to handle, will continue to be preferred wherever it is not particularly desirable to keep water out of a productive zone. This also applies in many situations to coring operations. Here the advantage of oil-base is not merely operative, but principally from the standpoint of laboratory examination of the cores, especially as regards to content of connate water in relation to estimations of reserves. It is

viscosity. Photo, courtesy The Lamp, Standard Oil Co., (N. J.)

Above: Wildcat drilling near Kettleman Hills, Calif.
Left above: Mud pits at Carter Oil Company's Bingham No. 1, McClain County, Okla.

true that cores are sometimes badly flushed by an oil-base which renders the result of the core analysis uncertain unless special procedures are invented and used, such as (according to one authority) coring a thick sand section using water-base and oil-base muds alternately.

Use of oil-base muds has been recommended for a variety of specific cases. It has been found to be of considerable advantage to use an oil-base mud where salt water flows of high concentration are encountered during drilling. Water has a deterimental effect on all oil-base muds, but this can be controlled by addition of slaked lime. It is said that most operators experience no trouble with admixtures of water up to 10 percent water content.

Recent experience has shown that oil-base has much promise in drilling through the thick heaving shales in the Gulf Coast area, where great trouble was encountered several years ago on account of caving of the walls of the hole due to hydration of the shales. A number of holes have been drilled through these shales with oil-base muds, and caliper surveys have shown that bit-size holes were maintained throughout the shale sections.

Another important use of oil-base muds is in workover jobs on wells in old fields where the producing formations have been largely depleted, for cleaning out and resetting screen liners, and in preparing such old wells for secondary recovery of oil. In cases of this kind it is of much importance to keep water out of the formation, mainly from the standpoint of preventing water-logging of low-pressure formations that would obstruct free flow of oil.

Disadvantages of Oil-Base Muds

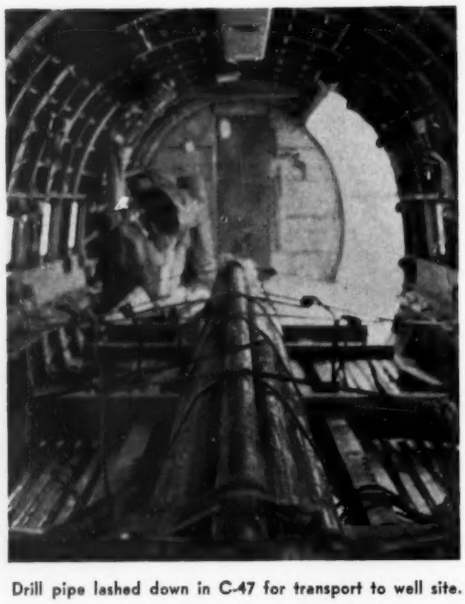
However, the advantages of oil-base muds must be set off against their disadvantages, which multiply and complicate drilling problems.

Drilling crews have to be paid extra for working with oil-base muds. The presence of circulating oil around the rig creates a fire hazard that must be rigidly guarded against; pump rubbers, unless distinctly oil resistant, are soon deteriorated at high circulating pressures, so that one of a pair of pumps will be down most of the time. According to recent announcements the cost of oil-base varies from $5.00 to $10.00 for light-weight muds, to $10.00 to $15.00 for heavy-weight muds. Losses in the hole may amount to 50 to 150 barrels, which at an average $13.50 per barrel to mix and maintain represents a considerable expense. Being a costly material it is necessary to guard against spills and waste, quite apart from the fire hazard. On the other hand, the oil may be used over again, especially where a central mixing and storage plant is set up from which a number of wells may be served; otherwise, storage tanks are needed at each well. Other items of expense include protection of mud pits from water drainage; water-cooled draw works and engines should be equipped to prevent water from getting into the cellar. Packer troubles are increased, due to deterioration of packer rubbers by the light oils in the oil-base.

Besides these inconveniences the use of oil-base mud has a distinct tendency to increase rig time for the same length of hole. The use of oil-base results in smaller hole sizes, and footage per bit is lowered. This does not apply strictly to holes in shale, but sands drill harder and will take more bits for the same footage. In fields studied by Kersten it is stated that the cost for shallow wells runs from $2,000 to $3,000 per well for material and handling. In a 10,000-ft. well, to drill 500 feet of oil horizon required 15 days extra rig time, and extra tools and fuel amounting to $3000. Total extra expense due to the use of oil base was $15,000, or $30 per foot of oil horizon. Reduction of this expense is possible by due care and guarding against waste. Some experience in this kind of work is obviously necessary.

The situation with oil-base is that it has proved its worth in the treatment of appropriate cases. Its main use is in formations that are likely to be damaged by water-base muds. In application to such cases the inconvenience and added cost are to be weighed against the benefits that are reasonably expected to follow from its use.

NAVY HAS AMBITIOUS PL



Drill pipe lashed down in C-47 for transport to well site.

WITH the war over and the oil men who carried on the government's field projects demobilized, the Navy has turned to the petroleum industry for technical advice and the know-how needed to explore its No. 4 petroleum reserve in northernmost Alaska. The work has been put on a civilian contract basis, the exploration to be carried out by the firm of Hoover, Curtis & Ruby, Inc. The firm of DeGolyer & MacNaughton has been engaged as special advisor to the Secretary of the Navy.

Plans and policies for developing the reserve are in the hands of an operating committee composed of Commodore W. G. Greenman, USN, Director of Naval Petroleum Reserves, chairman; Dr. W. E. Wrather, Director of the Geological Survey; Commander Henry C. Shaid, USNR, Bureau of Yards and Docks; L. W. MacNaughton, of DeGolyer & MacNaughton, and A. H. Chapman, vice president, Hoover, Curtis & Ruby.

The program of exploration includes reconnaissance by airborne magnetometer, aerial photography, geological surface mapping, sub-surface reconnaissance by gravity meter, seismography and core drilling, and finally the drilling of test wells on carefully selected locations.

Exploration to the present time has been limited to the eastern third of the reserve. Here the reconnaissance field work is practically completed and the U. S. Geological Survey in collaboration with the Navy and the photographic section of the Army is correlating the data and preparing maps for the use of the surface geological parties this summer. The geological work in the southern section of the area, and geophysical investigation in the northern (Cape Simpson) section have progressed satisfactorily.

One structure favorable to the accumulation of oil has been located at Umiat Mountain on the southeastern border and a test well, now down beyond 2,000 feet, is being drilled. The drill already has passed through a series of saturated sands although the tightness of the formation raises questions as to the recoverability of the oil they contain. It is expected to have the well down to 6,000 feet by September, which is as far as it will be practicable to go with the present equipment. According to MacNaughton, a 6,000-foot test is "reasonably adequate for proving the presence of oil." This structure has an oil seep on it, and he says, to his knowledge, there are no structures with oil seeps where the production comes from beyond a mile in depth. Also, their purpose is to find oil, not to completely exploit

Gravel was dragged from bed of Colville river in an attempt to combat water and mud at Camp Umiat.

Left, setting up core drill.

PLANS FOR ALASKAN OIL DEVELOPMENT

any particular structure. MacNaughton prefers to move easterly along the structure and put a test five or six miles east of the present location.

A preliminary pipe line survey has been made to furnish the basis for a detailed location survey if oil is found in sufficient quantities to warrant installing such a facility. Viscosity of the oil is so low, it is said, that its transportation during the Arctic winter offers no problem. Also, a preliminary report has been prepared on the estimated cost of producing the reserve and the transportation of the oil to west-coast refineries. The estimates indicate that a potential production of approximately 100,000 barrels a day from a reserve of from four to five hundred million barrels will be required.

As to the costs of developing the reserve in Alaska and laying down the crude in California, Navy figures that production of 100,000 barrels a day can be made available to west coast refineries by the investment of something in the order of $75,000,000. This is based on a probable economic justification only if a total of half a billion barrels is ultimately recoverable.

Crude from Naval Reserve No. 4, it is figured, can be delivered from Alaskan warm water ports to the San Francisco refinery area by tank ship at a cost of from 15 to 21 cents per barrel. And it can be transported from the field to tide water by pipe line at a cost of from 23 to 33 cents a barrel.

	Minimum	Maximum
Geology and preliminary	$ 2,500,000	$ 5,000,000
Drilling (400 original wells)	10,000,000	40,000,000
Pipe line road	13,000,000	17,000,000
Pipe line	23,500,000	30,000,000
Marine terminal	1,000,000	3,000,000
Total	$50,000,000	$95,000,000

Commodore Greenman and his advisors are very optimistic over the possibilities of the reserve. They believe conditions there are ripe for a big strike and have in mind the eventual development and production of the reserve by private industry on some commercial basis yet to be worked out.

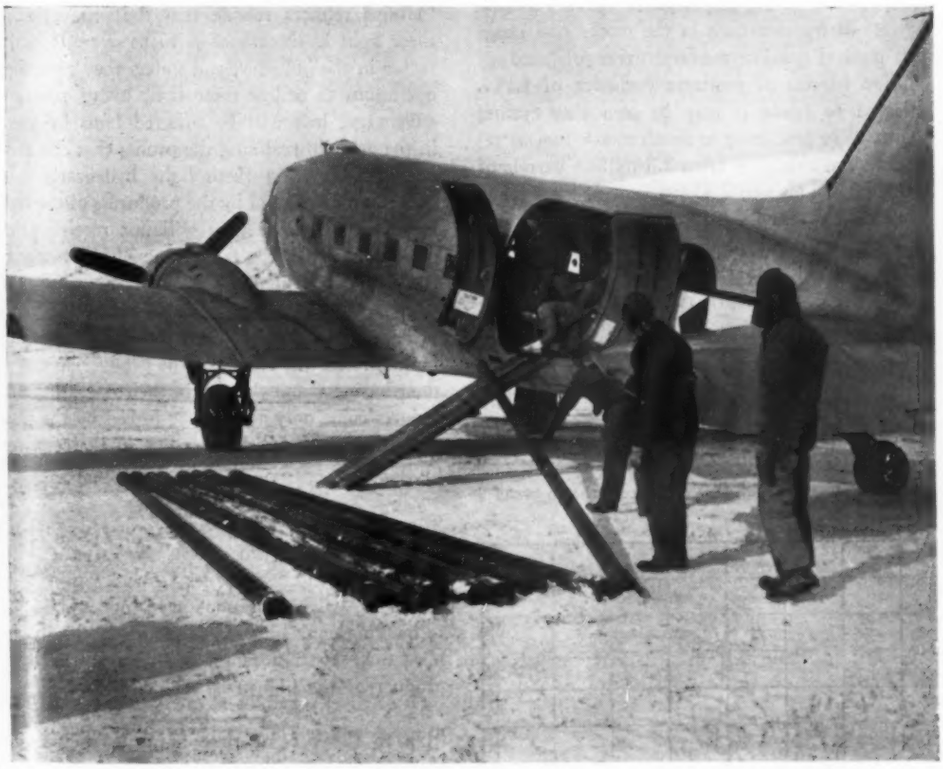
Says Greenman, "If we come up with a definite indication that oil in quantity is there, say in the vicinity of a half billion barrels or more, it will bring the field within the range of commercial development. I believe if we develop several structures along the lines we are working on now, that is by drilling one or two wells into each structure, we can establish its position in this respect. Then we can come back and make the proposition that the government install the facilities to move it out, basing the request on the strategic location of the field with relation to the failing supply of oil in California and the fact that facilities must be installed and maintained in peacetime in order that the oil may be immediately available when the emergency develops.

"Next we should go to the industry and say 'Now, here is oil,' and we know we have it in quantities. 'You go in and spend your money to drill the additional wells either in or adjacent to the reserve which will give you a certain percentage of the estimated oil content sufficient to pay you ultimately for your venture and the government will make available transportation facilities at a fair price to permit you to market it.' In this manner potential production and maintenance of transportation facilities will be assured for an emergency."

Navy also thinks that a plan might be forthcoming to throwh the reserve open and industry might bid, or a combination of companies would be invited to come in and develop the field on a sound economic basis, retaining for Navy certain specified pools or quantities of oil. They believe that such a proposal would have appeal and support from the public, at least in certain quarters. Others, however, feel that the complete development should be in the hands of the government.

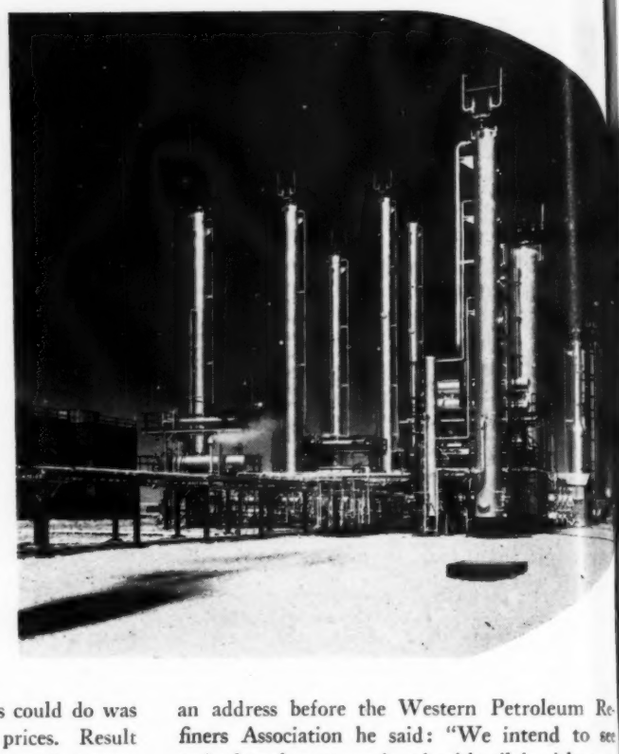
Another possible plan, advanced by the Navy consultants as a bit unique but not as bizarre as it might seem at first glance, is to have the government build a pipe line for getting the oil out and let private industry develop the fields. Or the government could develop the fields. At all events the oil would be brought down to San Francisco, say, and refined and utilized in trade for reserves already proved in barrels of oil. In other words, half a billion barrels of oil in Alaska might be traded for half a billion in the San Joaquin Valley to be kept in the ground. Navy admits that litigation with landowners and other factors might not make this as easy to accomplish as it sounds.

This idea originated with L. W. MacNaughton, who says: "the value of petroleum reserves to the Navy, of course, is greater if they are located within the continental United States. It can be defended much better than if it is located outside the continental United States. So I made the suggestion that this reserve, if oil were found, could be developed and oil transported to the west coast and there turned over to companies to do with as they see fit. But for each million barrels we deliver to them they give us the right to a million barrels in the ground within continental United States. We then not only have the oil that we have produced up there, but we have the oil within the continental United States."



Unloading drill pipe from C-47.

BROADENING FIELD FOR NATURAL GASOLINE



Absorbers and fractionators at new Winnie, Texas, plant of the Glenn H. McCarthy Co. Elwood M. Payne photo.

SINCE 1924 when the late Henry L. Doherty advanced his theory of the function of dissolved gases in oil production the industry's concept of conservation has been growing and changing from year to year. Once "physical waste" meant permitting oil to run down the creek or pumping it into open pits to beat the other fellow to it. Today it means vastly more.

Doubtless the development of processes for the manufacture of motor fuel from natural gas have had a good deal to do with some of the recent changes in conservation ideas and state regulations. That and the vastly improved techniques of using natural gas as a carrier of heavier hydrocarbons as well as a supplier of lifting energy.

Noting progress of the industry in conservation some regulatory bodies have begun issuing rules requiring everyone to put into effect the most advanced practices of progressive companies. The Railroad Commission of Texas has taken the position that utilizing gas energy in oil production and stripping it of its gasoline is not enough. It may not subsequently be flared even though there is not a buyer at hand. One company, for example, has developed large sweet gas reserves in the Gulf Coast area and proposed to erect a natural gasoline plant to process the gas. "What about the residue?" the commission asked. When it appeared that no outlet had been found and that reinjection into the sand did not appear feasible, the commission told the company that it must find a sale for the gas before the plant can be erected.

The natural gasoline and cycling industries have asserted for years that they were contributing much to conservation and that the refining industry should utilize the production of light hydrocarbons fully and at fair prices. Through research and educational campaigns the natural gasoline manufacturers have sought to prove the value of their product due to lead susceptibility and volatility. But when refiners did not buy freely about all the manufacturers could do was to invade the jobbing field or cut prices. Result often has been wildly fluctuating markets.

Validity of the light hydrocarbon industry's claims of aid in conservation of petroleum may be seen from current production figures as related to crude oil. In April oil refiners obtained a 44 per cent yield of motor fuel from crude oil. In the same month cycling plants produced 1.25 million barrels of hydrocarbons in the motor fuel range and natural gasoline manufacturers produced six million barrels of products exclusive of LPG. Related to crude it may be seen that cycling plants were producing as much motor fuel as refiners were obtaining from 2.8 million barrels of crude oil. This was 2.45 per cent of total crude charged to refiners stills. Combined natural and cycling plant products in the motor field range was equal to 12 million barrels of crude or 8.9 per cent of April refinery throughout.

Recently Col. Ernest O. Thompson of the Texas Railroad Commission gave the natural gasoline and cycling industries some official support. In an address before the Western Petroleum Refiners Association he said: "We intend to see to it that the gas produced with oil is either returned to the reservoir to maintain the reservoir pressure or to see to it that the liquid contents are first saved and then the gas is put into transmission lines for domestic, commercial or industrial use; gas wastage is going to be stopped in this state.

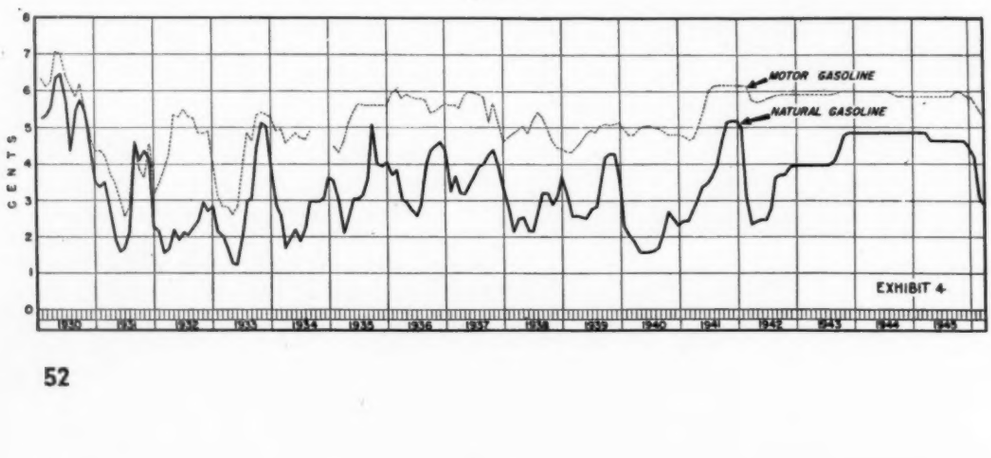
"Unless refiners realize that the production of these light hydrocarbons is to be a really major factor in the industry, and unless they plan their operations to utilize these light hydrocarbons to advantage, loss will be suffered both by them in the delay in realizing the profits that can come out of converting these light hydrocarbons to maximum value, and by the producers of the light hydrocarbons, since they will not receive prices comparable with the true value of the materials they are producing.

"Characteristically, refiners are sometimes unfamiliar with the trends of the production end of their business, and changes in their operating procedures come only as they are forced by the pressure of an accomplished change in their sources of supply.

"As a generalization, it seems to be true that the lighter stocks gain progressively in value with increasing API gravity, at least up to a gravity of 60° API, when operations are properly laid out to handle them. The generalization naturally applies only because motor gasoline is the main product of the industry.

"Up to the present time natural gasoline has been consumed almost entirely, for control of vapor pressure and distillation range, as a blending agent in motor gasoline. In this use it has been a rather essential component of the finished

Figure 1: Monthly average 26-pound Natural Gasoline price, Group 3 compared with tank car price of house brand gasoline.



gasolines. However, the demand, as you know, has fluctuated greatly with seasonal vapor pressure requirements. The increasing production of natural gasoline will make the available quantity far greater than can be consumed for this purpose, and other means of converting it to a final marketable product will be necessary.

"So I plead with you: plan to utilize these lighter hydrocarbons that are surely going to be made more and more abundant by our more rigid conservation practices. The Railroad Commission of Texas is determined to do its full duty in stopping flares of casinghead gas. These gases will furnish more and more your raw material.

"Public opinion will demand that the products of conservation, which these raw materials are and which the greatly enlarged quantity will be, should be used first in making motor fuels and that the crude oil in the reservoir shall be brought forth only in sufficient quantities to make up the difference."

Subsequently Colonel Thompson issued a further statement in which he said that either refiners would purchase all of the condensate and natural gasoline available or the Commission would prorate crude production to such a point that the demand for the total hydrocarbon supply would balance with demand. At the time the Colonel was speaking the price of natural gasoline had dropped 39 percent in Oklahoma and 36 percent in Texas from wartime prices while the price of house brand motor fuel was off 15 per cent in Oklahoma and even less in Texas. The more abrupt decline in natural gasoline prices was reflecting the reluctance of refiners to buy when they were having their own troubles with excess gasoline stocks and shortages of distillate fuels.

Since early spring the situation has been mended to some extent, if not cured, by the ability of refiners to obtain a better price for distillate fuel oils. Prices of No. 2 fuel in the Southwest have increased 0.5 cent per gallon and 0.3 cent in New York harbor. Result is that No. 2 fuel now sells at 89 per cent of the house brand gasoline price at New York, 77.5 per cent on the Gulf Coast and at 70 per cent in Oklahoma.

April report of the U. S. Bureau of Mines shows the result of the better fuel price on production. Refiners were finishing 14 per cent of their crude throughout as distillate fuel in April 1945 and 16.5 per cent in April 1946. In the same months motor fuel yields had dropped from 46 to 44 per cent. Meanwhile motor fuel consumption has been far better than was anticipated with the result that supplies are no more than adequate and refinery gasoline prices have regained all of their lost ground in most areas and natural gasoline prices are up 25 per cent from their spring low.

The current surplus of butanes is large despite the fact that synthetic rubber plants are operating at capacity and cracking operations are being conducted so as to minimize C4 production. The iso-butane market has fallen to about half its wartime high and now commands a premium of only about 0.25 cent per gallon over normal butane. Refiners are continuing to operate their isomerizers, however, and all alkylation plants are running at capacity. There are several reasons for this. Excess normal butane at the refinery can be valued only at its fuel equivalent or around 0.8 cent per gallon in the Southwest even though the open market for LPG is on the order of two cents. This is because the market could not absorb all available supplies. At 0.8 cent per gallon it is profitable to produce isomers for alkylation with unsaturates and provide a high octane blending stock. The lead shortage also makes the operation more attractive.

At the annual meeting of the Natural Gasoline Association of America this spring J. H. Dunn, association president, estimated that the refinery surplus of butanes will average 50,000 barrels daily during the next few years. He showed that the natural gasoline industry has an available annual supply of 36.7 million barrels of butanes and 10.3 million barrels of propane. Mr. Dunn suggested that the natural gasoline industry should push development of the LPG industry as an outlet for excess butanes and supply refiners with butane-free blending stock.

Mr. Dunn referred to the fact that the natural gasoline and cycling industries can invade the motor fuel market direct if they must. He cited the following as typical motor fuels which might be marketed, stating that while they are somewhat unconventional there is ample evidence that they will give good satisfaction to motorists.

As a matter of fact the industry currently is selling more motor fuel direct to the jobbing trade. April direct sales totaled 719,000 barrels compared with 633,000 barrels in April a year ago. This increase of 13 per cent is indicative of what happens regularly when natural gasoline prices drop too low. Wide fluctuation in natural prices over a period of years are shown in Fig. 1.

Motor Fuels From Natural Gasoline Sources

	1 30%, 10 lb. Natural plus 70% Cracked Naphtha (Desulfurized)	2 Cycle Stock A	3 Cycle Stock B
Gravity °A. P. I.	63.4	64.9	68.7
Vapor Pressure—Reid	7.4	7.5	8.0
ASTM Distillation °F			
I. B. P.	118	113	106
10% rec.	140	140	136
20%	154	149	149
30%	168	160	164
40%	186	175	185
50%	214	189	206
60%	242	204	231
70%	268	221	259
80%	312	248	293
90%	354	281	328
E. P.	398	367	386
Recovery %	98	97	98
Loss %	1.0	2.0	1.0
Octane No. ASTM—Clear	61.4	67.0	59.0
1 ml. Tel/gal.	70.8	76.0	70.0
2 ml. Tel/gal.	74.5	81.0	76.9
3 ml. Tel/gal.	76.3	...	79.4

Mr. Dunn told the association that 67 per cent of the natural gasoline and allied products was shipped by pipeline from plant to refinery in 1944 compared with 60.6 per cent in the first half of 1945. It was his contention that refiners can afford to use the light hydrocarbons much better if they go by pipeline at low (or no) cost since natural gasoline often rides free in crude lines because of its effect on oil pumpability.

With production of light hydrocarbons increasing steadily and a considerable number of new plants now under construction and planned the attitude of the Texas Railroad Commission and other state conservation agencies will be watched carefully by the industry.

Growth of Natural Gasoline and Allied Industries.

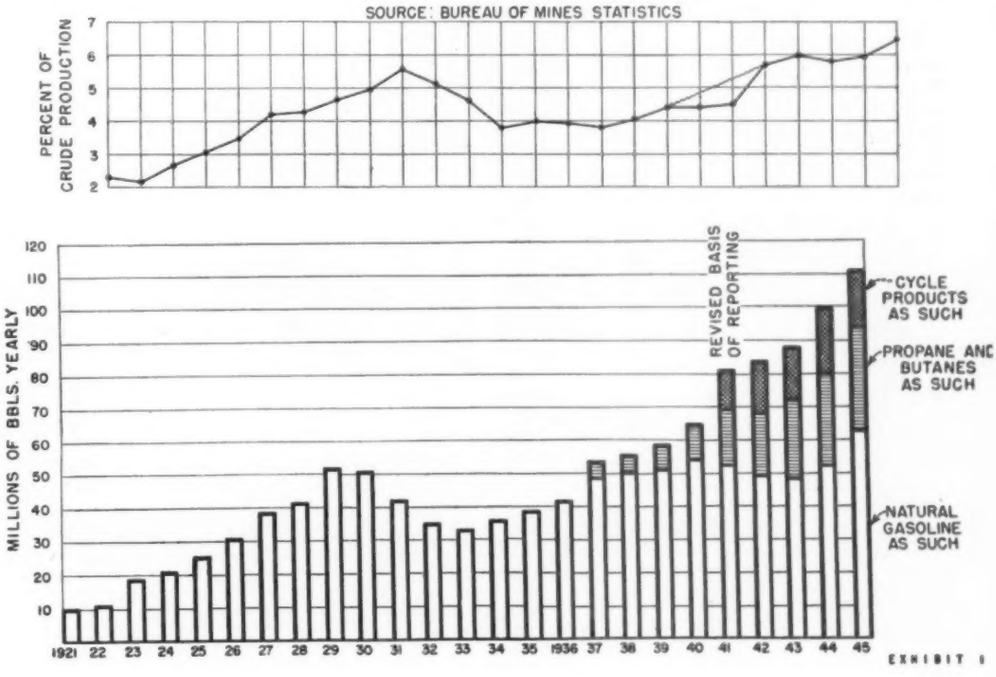

SOURCE: BUREAU OF MINES STATISTICS
PERCENT OF CRUDE PRODUCTION
MILLIONS OF BBLS. YEARLY
REVISED BASIS OF REPORTING
CYCLE PRODUCTS AS SUCH
PROPANE AND BUTANES AS SUCH
NATURAL GASOLINE AS SUCH
1921 22 23 24 25 26 27 28 29 30 31 32 33 34 35 1936 37 38 39 40 41 42 43 44 45

EXHIBIT I

CAPITAL SIDELIGHTS ON OIL

By W. J. MADDOX, *Chief of World Petroleum Washington Bureau*

Attorney General's Ruling

Tom Clark

In giving his official blessing to the new NPC, Attorney General Tom Clark threw out some suggestions as to the protocol to be observed by industry committees to keep them from getting snarled up with antitrust restrictions. His advice on the Justice Department's attitude as to what such groups can and can't do will guide the Council's policies and activities though some members seemed to feel that the line drawn by the Attorney General between "can" and "can't" was a bit hazy. In his letter to Interior Secretary Krug, the Attorney General said that his department "recognizes that committees such as you proposed may be a valuable source of information and advice." And continued:

"The Department of Justice has never taken the position that consultation by any industry committee with the government violates the antitrust laws. The Department has no objection to the formation of industry committees to advise and consult with government agencies. As a general matter, the formation of such a committee to advise any particular department of the government is the responsibility of that Department. . . . Consultation, of course, does not involve the determination by the industry advisory committee of policies or the administration of programs which should be the responsibility of the government agency. . . . The determination of policies is the sole responsibility of the government agency served by the committee. . . . Membership on the Council or on any of the committees cannot be regarded as conferring on the participants any immunity from the antitrust laws. If, apart from the legitimate activities of the Council or the committees thereof, they should agree on any private plan or program as a group or take part in any such plan or program, the Department will feel free at all times to invoke, if necessary, the antitrust laws against the participants notwithstanding the fact that some or all of them may have been members of an industrial advisory committee.

"While membership on any committee is a matter for determination by the government agency sponsoring the committee, the Department of Justice believes that provision should be made so that all groups are afforded representation on the committee and no group is prevented from bringing its grievances or suggestions to the government. The advisory committee should not be permitted to become the exclusive channel in the industry for the submission of the industry's views to the government."

National Resources Board

As a part of his plan for merging the Army and the Navy, President Truman passed along to Congress a proposal for establishing a National Security Resources Board. The suggestion for such an organization was made in a joint report of the War and Navy Secretaries "to establish and keep up to date, policies and programs for the maximum use of the nation's resources in support of our national security." The Board would be composed of representatives of the military services and "other appropriate agencies." It would operate under an overall council consisting of the Secretary of State, the civilian heads of the military establishment, the civilian heads of the military services, and the chairman of the National Security Resources Board.

Ends Five Years Service

H. Chandler Ide, who was Deputy Administrator Davies' executive assistant at the time PAW folded on May 8 and since has been a consultant to the newly formed Oil and Gas Division, has resigned after more than five years of public service. As Davies put it, he was the "first to join me here for war service in June 1941 and the last to leave, having remained the full period of life of the Petroleum Administration for War and its predecessor organization, the Office of Petroleum Coordinator."

Before coming to PAW, then OPC, in June, 1941, Ide had been associated for several years with California Standard in various capacities. Shortly After Davies was appointed Deputy Petroleum Coordinator, Ide joined the staff of the agency and has seen continuous service as his executive assistant. He is a native of Mount Vernon, N. Y. and was graduated from Pomona College, where he was elected to Phi Beta Kappa. His home is in Alameda County, Calif.

National Petroleum Council

Walter S. Hallanan

The new National Petroleum Council, designed to be the peacetime liaison between industry and the government as PIWC was during the war, got under way June 21 at its initial meeting called by Secretary of Interior Krug. Sentiment among the oil men regarding the new set-up ranged from "highly favorable" to "let's see how it works." Only 53 of the 85 members were present due to the short notice given of their selection. Walter S. Hallanan, president of the Plymouth Oil Company, who was chosen temporary chairman, expressed the temper of the meeting.

"We are anxious," Hallanan told Secretary Krug, "to proceed deliberately in exploring the possibility of a continuance of the government-industry team for the promotion of the public interest. However, we do so with a determined feeling that there should be no infringement by government upon the principles of complete independence of the petroleum industry in the conduct of its business.

"We are anxious to give cooperation in every way to promote the public interest and for the attainment of those goals necessary to meet every requirement which the petroleum industry will face in the years that lie ahead. That cooperation, however, must be on a basis that at all times will maintain the independence of the industry free from government control or domination. I speak with every confidence that both you and Mr. Davies will agree that the industry must at all times be alert to its responsibility to maintain its complete freedom from government control. Through this National Petroleum Council and the Oil and Gas Division of the Interior Department, which you have created, we can promote a cooperative effort that will at all times maintain that independence and at the same time, promote the industry's welfare and the government's understanding of petroleum problems in a way that will be enormously helpful."

Russell B. Brown, general counsel for IPAA, was chosen to be temporary secretary for the group. The meeting was behind closed doors and it is likely that the custom established by PIWC will continue. From his experience with the industry advisory committees in his WPB days, Krug feels that more can be accomplished by going into executive sessions.

Next quarterly meeting of the Council is expected to be held here in September. In the meantime a temporary committee of fifteen appointed by Hallanan will formulate organization plans to be submitted to the group then. The committee: O. D. Donnell, Findlay, Ohio; J. Frank Drake, Pittsburgh, Pa.; B. A. Hardey, Shreveport, La.; George A. Hill, Jr., Houston, Tex.; Eugene Holman, New York City; A. Jacobsen, New York City; B. Brewster Jennings, New York City; W. Alton Jones, New York City; B. L. Majewski, Chicago, Ill.; A. C. Mattei, San Francisco, Calif.; J. Howard Pew, Philadelphia; Joseph E. Pogue, New York City; Frank M. Porter, Oklahoma City, Okla.; Charles F. Roeser, Fort Worth, Tex.; Robert E. Wilson, Chicago.

Short of Funds

Ralph K. Davies, acting head of Interior's newly created Oil and Gas Division, who by the way has announced that he will retain his position only till such time as the Division is organized and ready to operate, probably will have to go to Congress to get additional funds to get the infant organization on its feet. Congress cut the $449,516 allowed by the Budget Bureau for OGD to an even $400,000, but $216,908 of this had already been allocated to the old Petroleum Conservation division, which OGD absorbs for administering the hot-oil act. This leaves OGD somewhat less than $200,000 for organization expenses and the rest of the work of the division.

Parten Declines

J. R. Parten

Among the recent refusals President Truman has met in his attempts to entice outstanding men into government service, one that caused him particular disappointment came from Jubal R. Parten, wartime director of PAW's transportation division. The President let it be known at a recent press conference that he had been unsuccessful in trying to persuade Parten to leave his Texas oil interests to head the economic council and administer the full-employment law. One reason influencing Parten's decision may have been the smallness of government salaries—in the case of the council job, $15,000—but another may be the distaste shared by many business executives for the conditions surrounding the federal service. According to Mr. Truman's view as expressed so bitterly in his letter to Senator Tobey the fight waged on Ed Pauley, Californian nominated to be Undersecretary of Navy, has added to his difficulties in getting good men for key government jobs.

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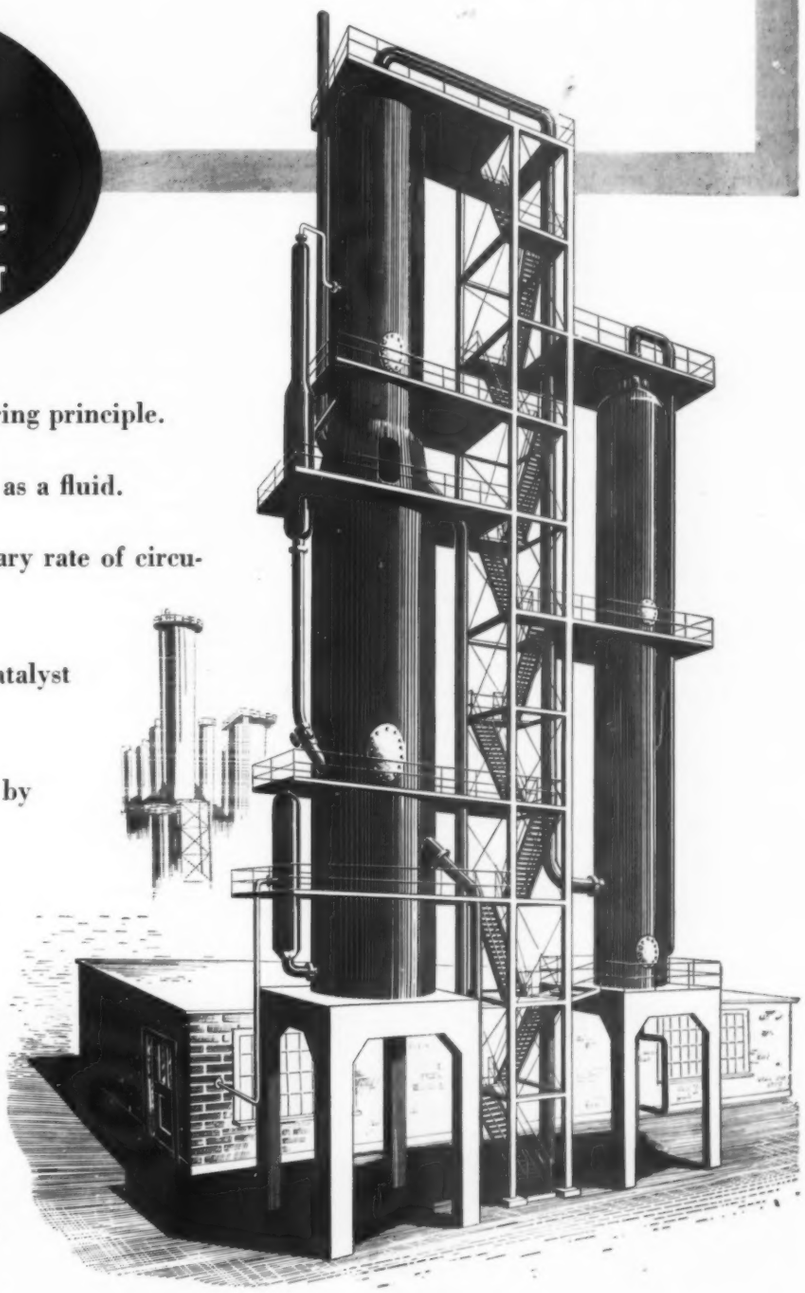

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Oil Company Staff Changes

CHARLES F. ROESER, president of Roser & Pendleton, Inc., Fort Worth, and vice-president of the American Petroleum Institute, has accepted election as a trustee of Marietta, Ohio, College. Mr. Roeser also serves as chairman for the Texas Christian University building fund campaign. In the early 1900's, Mr. Roeser was outstanding in athletics at Marietta Academy and the college. After working with his father, William Roeser, in Ohio oil fields, he and his brother William Jr., went to Tulsa, Okla., in 1906, then later moved on to the Texas fields.

Marietta College recently established the Edwy R. Brown School of Petroleum under a $300,000 bequest from Edwy Rolfe Brown, former vice-president and director of the Socony-Vacuum Oil Company, Inc. It was opened last fall, in a newly purchased building, and soon enrolled 52 students, most of whom are ex-servicemen.

T. RIEBER, president of Barber Asphalt Corp., has been elected a director of TACA Airways, S. A. He fills the vacancy on the board caused by the resignation of Charles E. Mathews who also was a vice president. TACA, through associated companies, serves Latin America over its 22,558 miles of routes, the longest in the Western Hemisphere of any airline operating in that area.

W. V. HARTMANN, vice president in charge of marketing of Gulf Oil Corp., retired July 1 after 58 years in the oil business, 43 of them with the Gulf organization. His training in the oil industry began in 1888 when he was employed by the Standard Oil Company at Evansville, Indiana. He joined the Gulf Refining Company August 10, 1903, coming to Pittsburgh as assistant to G. R. Nutty, then manager of sales for the new enterprise that had had its beginnings in the famous Spindletop Gusher "brought in" near Beaumont, Texas, on January 10, 1901.

Mr. Hartmann became general manager of light oil sales in 1915. He was elected vice president of the Gulf Refining Company in 1930, a director in 1933. He was elected vice president of Gulf Oil Corporation in 1935, and a director in 1939.

J. COARD TAYLOR, 45, vice president in charge of sales of Ethyl Corporation, died suddenly of a heart attack on June 25. He had been associated with Ethyl for twenty years, serving first as Canadian representative, later as assistant sales manager and general sales manager and since 1937 as vice president. He entered the oil industry in 1923 with the Standard Oil Company (N. J.) as a student engineer and worked as a driller for Humble Oil and Refining Company in Corsicana, Texas and as a member of the sales and refinery staffs of Imperial Oil, Ltd. in Canada before joining Ethyl.

R. N. DUNCAN was recently appointed manager of the supplies department, Shell Oil Company, Inc., New York. He has been acting manager for several months. Duncan began his career with Shell in 1927 as a clerk at the East Chicago refinery. He was transferred to New York as head supply and statistical clerk in the supplies department in 1940.

MAJOR LOGAN C. WATERMAN has rejoined the Petroleum Rectifying Co. after serving in the Army Air Forces for three and a half years. Major Waterman spent two years overseas, in Australia, New Guinea, the Philippines, China and Japan. He will now be located in the Petreco Houston office, in an executive engineering capacity.

A. C. LONG has been named assistant to C. E. Olmsted, vice president of the foreign operations departments of The Texas Company. He formerly was manager of the executive sales division of foreign sales department. He has been associated with Texaco since 1930. During the war Mr. Long spent 14 months in government service largely as petroleum attaché for the State Department in London.

Mr. Olmsted also announced that Franz von Schilling has been named assistant manager of the European and African divisions of the foreign sales department. Since 1942 Mr. von Schilling has been on military leave of absence from the California Texas Oil Company Ltd. While in the Navy, he was on duty in Cairo as State Department petroleum attaché with the rank of Lieutenant Commander.

W. R. GOODWIN and R H. Sherman were elected directors of Creole Petroleum Corporation at the recent annual meeting. Mr. Goodwin, assistant coordinator of foreign marketing for Standard Oil Co. (N. J.), replaces E. E. Soubry who resigned. Election of Mr. Sherman enlarges the board to nine members.

President A. T. Proudfoot announced that Mr. Sherman has been elected a vice president and will be general manager during his own necessary absences from Venezuela. Mr. Sherman has directed Creole's geological and exploration activities in Venezuela for the past 13 years.

Dr. PARKE A. DICKEY, 37, will direct the geological phase of research activity at the Tulsa laboratory of The Carter Oil Company. After obtaining his degree in geology from Johns Hopkins in 1932, Dr. Dickey spent several years in South America with the Tropical Oil Company. Later, he was associated with the Pennsylvania Geological Survey and with Forest Oil Company and Quaker State Oil Refining Corporation.

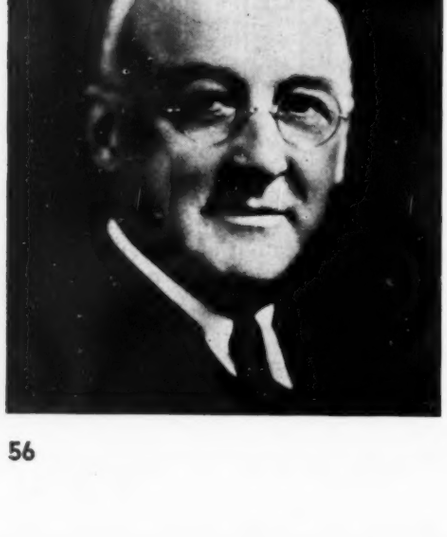
GAIL E. LINDLEY, after five and one-half years in the USNR which he recently left with rank of Captain, has been appointed vice-president in charge of marine operations of Richmond Petroleum Co. (Standard of California) parent company of Richmond Exploration Co., their Venezuelan affiliate, and Richmond Petroleum of Colombia. He was formerly in Standard of California's marine department, having been there since 1922.

One of Mr. Lindley's first assignments as Richmond Petroleum's vice-president was a month's trip to Venezuela where he visited the company's operations both at Pedernales in Eastern Venezuela, and in the Maracaibo Basin.

D. T. RING of Columbus, Ohio, vice president in charge of production for The Preston Oil Co., The Union Gasoline and Oil Corp. and the Virginian Gasoline and Oil Co., was elected president of the Pennsylvania Grade Crude Oil Association at its recent annual meeting. He has been a director of the association for seven years and a vice president for two years.

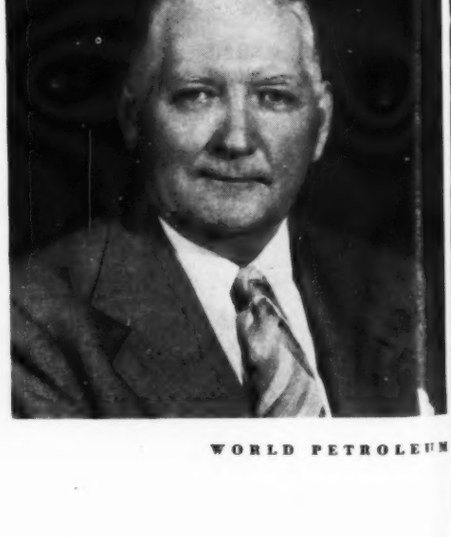
Mr. Ring is a member of the general production committee of the A.P.I. and chairman of its central district activities. He is a vice president of the Independent Petroleum Association of America and a member of Ohio State University's advisory and research committee on oil.

W. V. Hartmann



A. C. Long

D. T. Ring



Claude V. Parsons

CLAUDE P. PARSONS has been appointed vice president and special sales representative of Hughes Tool Co., Houston, according to an announcement by Noah Dietrich, executive vice president of the company. He comes to the company from Halliburton Oil Well Cementing Co., Duncan, Okla., where he has been vice president in charge of sales. In his fourteen years with Halliburton he served also as chief field engineer and sales manager.

Following his war service in the air force in World War I Mr. Parsons worked in various fields for Magnolia Petroleum Co. He has come to be recognized as one of the outstanding men of the industry in solving tough drilling problems. As a result he has been greatly in demand as a speaker before technical meetings. Mr. Parsons has served for many years on the drilling practice committees of the American Petroleum Institute and the American Association of Oil Well Drilling Contractors.

C. J. HAVOKOTTO has returned to the New York branch office of Cooper-Bessemer Corp. as sales engineer after four years of military service. He joined Cooper-Bessemer in 1938 in the engineering department at the company's Mount Vernon, Ohio, headquarters and was transferred to the sales department in 1939. He came to the New York office shortly before entering military service.

R. E. "SKEET" BERRY has returned from the Army and joined the Rocky Mountain staff of the Axelson Manufacturing Company. The addition of Berry to this division will augment the services of Harry McCoy who has been with Axelson, in several districts, for the past eleven years.

R. F. (TED) BARTLETT, JR., has rejoined the staff of the Dallas office of The Cooper-Bessemer Corp. as sales engineer, following five years of service in the Army.

He was called to service as a lieutenant and attained the rank of Lieutenant Colonel in the Ordnance Department.

BARNEY BLAIR has been appointed manager of a new district in the Rocky Mountain area for the Mid-Continent Supply Co. District offices are at 406 Patterson Building, Denver, Colo. Mr. Blair joined Mid-Continent in 1937 at Lisbon, La., and has since represented the company at Shreveport, La., Kilgore and Lubbock, Texas, and Oklahoma City, Edmond and Tulsa, Okla.

Rubert J. Lindquist

RUBERT J. LINDQUIST, financial vice president of Standard Oil Co. (Indiana), has been elected a director to replace Edward G. Seubert, who retired on his 70th birthday. Mr. Lindquist joined Standard last September to head up the financial, accounting, and tax affairs. He came from the Curtiss-Wright Corp., for which he was vice president, comptroller, and a director.

Mr. Seubert retired after nearly 54 years with Standard, the date of his starting with the company being farther back than that for any other employee. As president from 1927 and chief executive from 1929, he has filled both offices longer than any predecessor since the company's beginning in 1889.

He joined the company in 1891 at the age of 15 as a mechanic's helper in Standard's Whiting, Ind., refinery. After six months he was made a junior clerk, and from that time until his election as a director in 1919, he advanced through the accounting and financial branch of the company's management.

ANDREW H. CAMPBELL has been appointed general sales manager for the eastern container division of Rheem Manufacturing Manufacturing Co. G. Wesley Gates will be his assistant. Mr. Campbell is a former vice president of Atlas Steel Barrel Corp., Bayonne, N. J. and since its acquisition by Rheem, he has been general manager. Mr. Gates has been in charge of the New England and New York territory for the container division.

Andrew H. Campbell

William T. Gunn

WILLIAM T. GUNN, Yonkers, New York, has been appointed director of the division of Refining of the American Petroleum Institute. He succeeds Dr. R. P. Anderson, the post having been unfilled since Doctor Anderson's retirement on Dec. 31, 1944.

The New director graduated from the University of Texas in 1926 and entered the employ of The Texas Company at Port Arthur in December 1929. He was chemist in The Texas Company's research laboratory at Port Arthur, chief chemist at both the Houston and Casper Works, and came to New York in 1943 as assistant to K. G. Mackenzie.

In New York, Mr. Gunn's work has consisted to a great extent of research development and plant operation. He participated in the work of the technical advisory committee of the Petroleum Industry War Council.

AFTER 3½ years of active service, Major Stanley Asp, Corps of Engineers, has returned to the research division of the Filtrol Corporation, Los Angeles. He originally joined Filtrol's technical staff in 1928. Major Asp's army service was in both Pacific and European theaters.

JAMES J. COSGROVE, Vice President and General Counsel of Continental Oil Company, has been elected chairman of the board of directors. The bylaws of the company were amended to give the chairman executive powers. Mr. Cosgrove has been with Continental Oil Company since 1929.

James J. Cosgrove

International News and Notes

B. P. NEWTON

BERT PERSING NEWTON, vice president in charge of foreign marketing operations of Gulf Oil Corp., has been awarded the Order of the Cruzeiro do Sul, Comendador grade, by President Eurico Gaspar Dutra, of Brazil. The award was made at the Palacio Itamarati in Rio de Janeiro in the presence of Mrs. Newton and a small group of close American and Brazilian friends. The Order of the Cruzeiro do Sul (Southern Cross) is the highest decoration the Brazilian government can award an American civilian.

In his capacity of vice president in charge of all foreign marketing operations for Gulf, Mr. Newton has spent considerable time in South America since the close of the war.

Godber Succeeds Lord Bearsted

For reasons of health Lord Bearsted resigned early in June from the post that he had long occupied as chairman of Shell Trading and Transport Co. Ltd. of London. Sir Frederick Godber, joint managing director of the Royal Dutch Shell group, succeeded to the chairmanship. Hon. F. J. Hopwood who, as the British Petroleum Board's representative to the United States, spent the period from 1942 to the end of the war in New York and Washington, becomes a joint managing director of the group and a director of Shell Transport and Trading Co. Ltd.

Soviet Oil Program

Details of Russia's latest five year plan, released by the Soviet Embassy in Washington, show that oil production is slated for a 14 percent expansion over prewar levels, reaching a total of 35,400,000 tons (roundly 250 million barrels) annually. The goal set for attainment by 1960 is 60,000,000 tons (425 million barrels) a year. The eastern regions of the Soviet Union are to receive special attention and are expected to furnish 36 percent of the country's total output in 1950, as compared with their prewar production of 12 percent.

The Apsheron peninsula, it is said, has been thoroughly studied, new deep oil strata have been tapped, and new fields have been opened. Extraction of oil from the sea bottom has been begun, and what was Ilych Bay has been filled in and is covered with derricks. In the course of the present five-year period, the Baku field is scheduled for a 50 percent rise in output.

A new and rich oil base, the "Second Baku" is being developed in the square bounded by lines drawn from Kiev to Molotov, from Molotov to Chkalov, from Chkalov to Saratov, and from Saratov to Kirov. In this area, which lies between the Volga and the Urals, there are now numerous oil fields, power stations, pipe lines, refineries, repair factories, reservoirs, and compressors—everything necessary for extracting and refining oil.

In the new five year plan, exploitation of this region will assume wide proportions. In 1950 the output of oil in the Volga districts is to increase elevenfold compared with 1940, and in the Urals district by 320 percent.

The output of oil in Tuimazy this year, it is said, will treble that of 1945. Preparations are being made for constructing a 93-mile pipe line. Four new fields will be established in the Kuibyshev region and two cracking plants built. During the next five years the output in the Molotov region will be trebled.

A special Ministry of the Oil Industry of the eastern districts of the USSR was recently formed. Also, there is now a separate Ministry for the Building of Oil Enterprises. Formerly, construction was often carried on by state oil trusts, which to a certain extent diverted forces and funds from the extraction of oil, it is explained.

Large refineries are said to have been built for Nebit-Dag oil. The number of wells in this district has increased from eight in 1933 to 146 in 1945, and the output has jumped from 95 tons a day to 1,950. In spite of the difficulties presented by the semi-arid region, the oil fields are being expanded, and eastern Turkmenia is expected to become one of the largest oil centers in the Soviet Union in the course of the next several years.

Iranian Production

Crude oil production in Iran during the first quarter of this year totaled 4,784,000 tons. March production was 1,717,000 tons. Total production in 1945 was 16,839,490 tons according to an announcement by Anglo-Iranian Oil Co., Ltd.

The company also announced that its 1945 production in the United Kingdom totaled 71,542 tons.

Retires After 55 Years

W. A. (Jimmie) Green, who has represented Hadfields Ltd., of Sheffield in Birmingham and the South Midlands since 1891, has retired. He will continue to live in Moseley but will spend his winters in a milder climate.

Commander Nicholson Retires

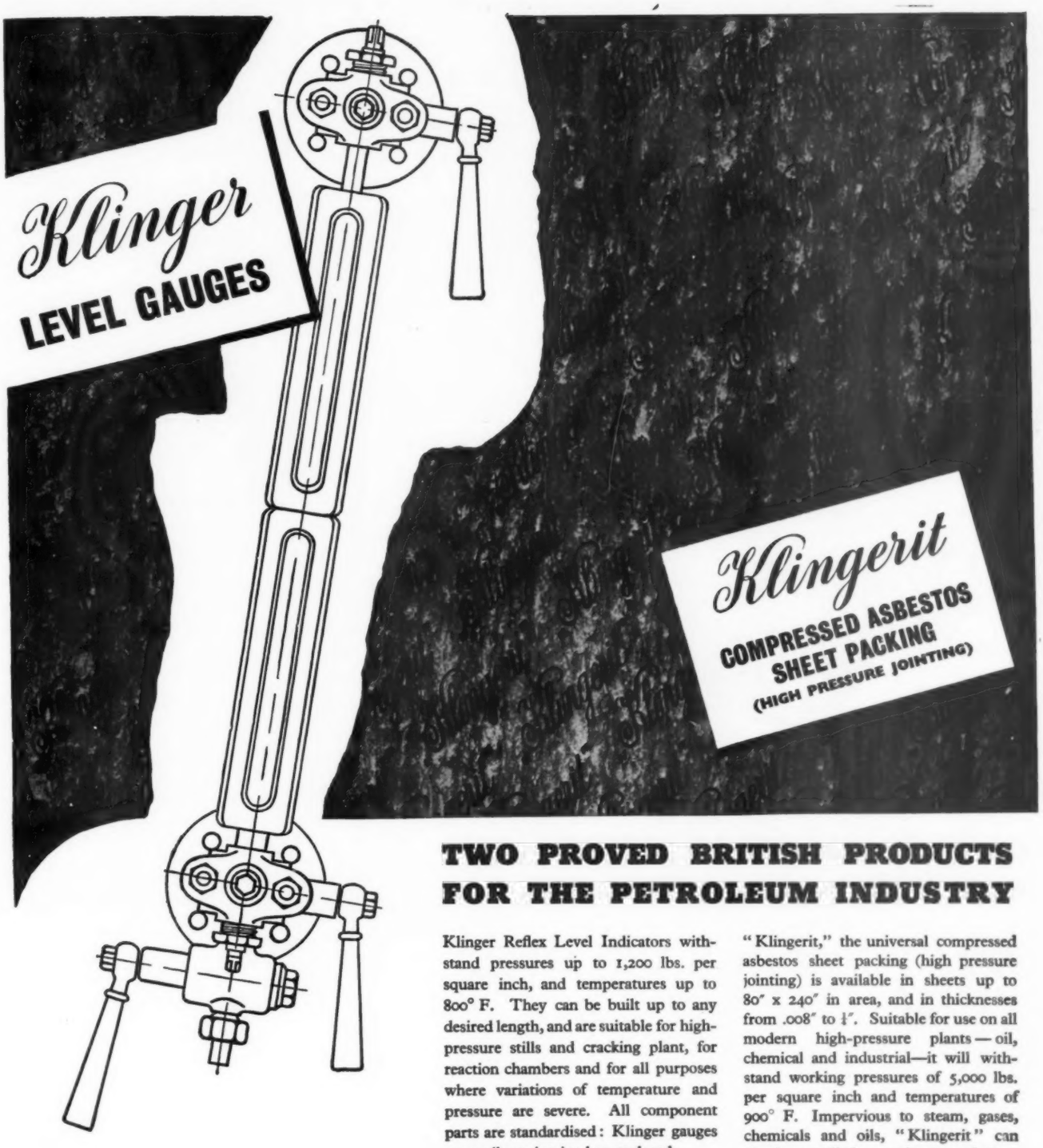
Commander E. H. M. Nicholson has retired from the board of Hadfields Ltd., Sheffield, after 32 years with the company. At a dinner given by fellow directors Lord Dudley Gordon, chairman of Hadfields, presented him with a silver salver with embossed signatures of his colleagues. While with the firm Commander Nicholson was concerned principally with the production of armaments. He organized the production of manganese steel helmets for the Iron and Steel Control.

Named to Anglo-Iranian Board

Field Marshal Viscount Alanbrooke and Sir Percival Robinson have been appointed by the British Treasury as ex-officio members to represent the government on the directorate of Anglo-Iranian Oil Co. Ltd. They succeed Sir Edward Packe who died in May last and Sir George Barstow who asked to be relieved because of the pressure of other duties.

Dallas Nomad Chapter Organized

A Dallas, Texas, chapter of Nomads with a charter membership of 36 was organized recently at the Dallas Petroleum Club. W. A. Green of the Tulsa chapter, chairman of the national board of regents, aided by Shep Miers, secretary of the board, installed the new officers shown in the photograph below.
Left to right: C. A. McClelland, regent; Arthur A. Burrell, vice president; Noble A. Endicott, president; S. S. Parker, regent; R. B. Moody, assistant sergeant at arms; E. G. Schroeder, treasurer. Not shown in the picture are L. A. Little who was elected treasurer and R. J. Bauer, sergeant at arms.



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"Klingerit," the universal compressed asbestos sheet packing (high pressure jointing) is available in sheets up to 80" x 240" in area, and in thicknesses from .008" to ¼". Suitable for use on all modern high-pressure plants — oil, chemical and industrial—it will withstand working pressures of 5,000 lbs. per square inch and temperatures of 900° F. Impervious to steam, gases, chemicals and oils, "Klingerit" can also be supplied as ready-cut gaskets.

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Industry Can Find Needed Reserves

Confidence in the discovery of new reserves sufficient to enable the American petroleum industry to meet the greatly increased demands for oil products anticipated during the next 20 years was expressed by E. T. Knight of The Atlantic Refining Company in a recent address before the Fuel Oil Distributors' Association of New Jersey.

"The present trend in crude oil production in the United States indicates that by 1965 production requirements will reach 5,400,000 barrels daily," said Mr. Knight. "To produce crude oil at these rates, the industry will be required to find and develop during the next 20 years at least 40 billion barrels of new reserves, or nearly 76 percent of the total amount of oil discovered since 1859.

"Approximately 40 billion barrels of the total discoveries of 52.3 billion barrels were found during the past 20 years, and 21 billion barrels of the additions to reserves were recorded from 1936 to 1945. Therefore, it is indicated that the annual task for the next 20 years is no greater than that of the last decade, when 2.1 billion barrels of oil were added to reserves annually."

Mr. Knight said that if the oil industry is freed from price control and applies its growing knowledge of survey and production techniques, and at the same time continues to expand drilling and exploratory activities, new reserves will be found through improved practices in development and production of proven areas, in the vast unexplored areas considered favorable to the production of oil in the United States and through the increased use of the secondary method of recovery in fields which have produced nearly their maximum under present production methods.

"I believe that sufficient domestic reserves will be found to meet all or nearly all demands projected," he said. "If this belief should prove to be too optimistic, or if there are temporary periods when discoveries lag behind requirements, then imports of oil from the vast reserves in the Western Hemisphere will be used to make up the deficit."

Joins Bechtel McCone

Gordon B. Zimmerman

Gordon B. Zimmerman has joined Bechtel Bros. McCone Co. as chief process engineer. He was with Universal Oil Products Co. for 15 years in various capacities including assistant manager of the Riverside laboratories and the developing of commercial designs for fluid catalytic cracking, HF alkylation, isomerization and other processes.

New Tennessee Geological Chart

THE TENNESSEE DIVISION OF GEOLOGY of the Department of Conservation, in cooperation with the U. S. Geological Survey, today announced the release of Oil and Gas Investigations Chart No. 3. This chart, approximately 32x28 inches, describes the subsurface stratigraphy and structure of the Stones River rocks in all or parts of 20 counties in northeastern Central Tennessee.

Copies of this Oil and Gas Investigations Chart No. 3 may be obtained from the Tennessee Division of Geology, G-5 State Office Bldg., Nashville 3, Tennessee, for 50 cents.

Seeks Back Issues

B. VEEN, librarian for Shell Petroleum Company, is seeking to rebuild that company's files of WORLD PETROLEUM from which a number of issues are missing because of war conditions. He desires copies of January, March, September, October, November, December and Annual Refinery issues in 1941 and January, February and March, 1942 issues. Readers who may have copies of these issues available for sale should write to Mr. B. Veen, Shell Petroleum Co., Lensbury Club, Teddington, Middlesex, England.

Opens District Office

THE H. K. PORTER COMPANY, INC. and subsidiaries, Pittsburgh, Pa. announces the opening of a new district office in the Paul Brown Building in St. Louis. This will be the twelfth district office handling Porter-Devine-Quimby refinery process equipment. R. E. Nelson, previously Assistant Manager of the Porter Process Division in Pittsburgh, will be in charge.

S.O. Indiana To Close Two Plants

NEODESHA, Kansas, and Greybull, Wyoming, refineries of Standard Oil Co. of Indiana, will be closed in 1948. Operations will be continued at the adjacent plants at Sugar Creek, Mo., and Casper, Wyo., where catalytic cracking units are being erected.

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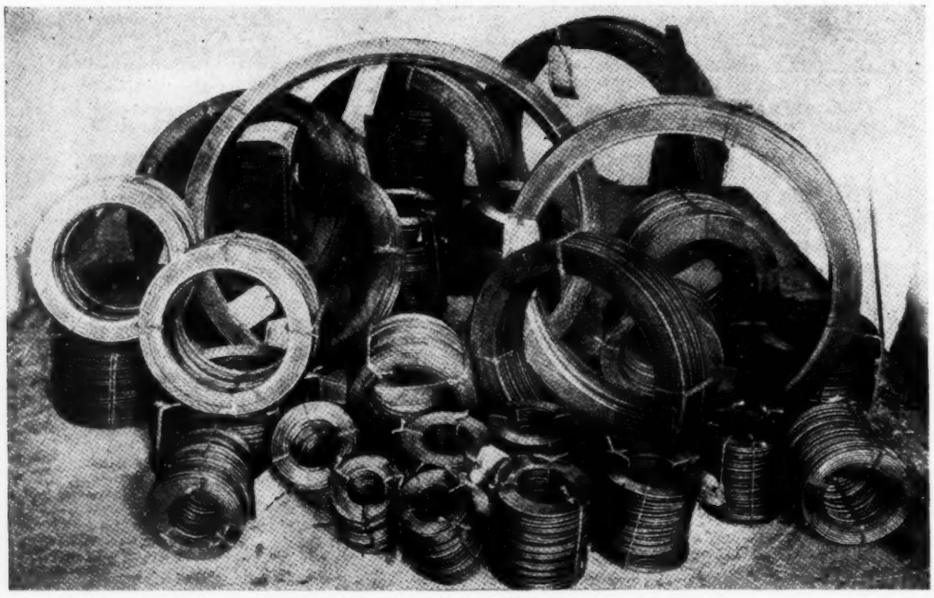

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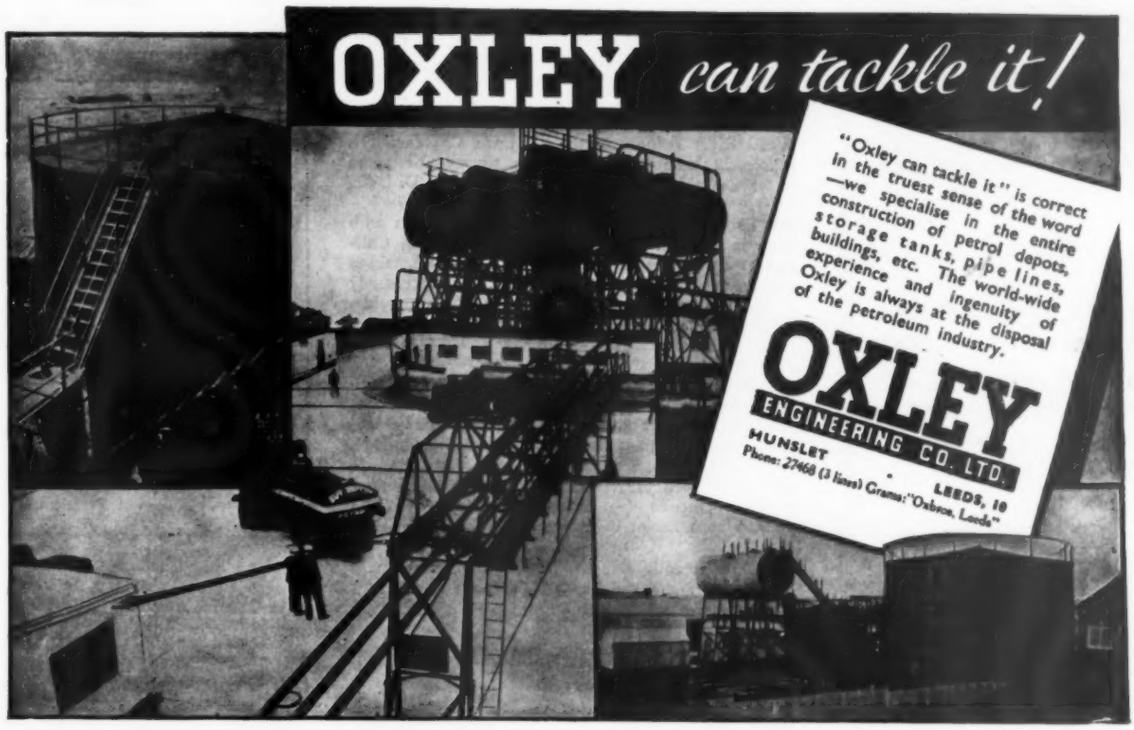
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Photograph shows one of many manufacturing processes for heat exchanger production in the Whessoe works—fully equipped for an output of high duty tubular heat transfer units. Processes include radiography and stress relieving as required by construction codes.

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West Coast Manager Appointed

Fred C. Ripley, Jr., has been appointed manager of oil well and export sales, for the California Division of International Derrick and Equipment Company. His headquarters will be at Torrance, California. Mr. Ripley will be in charge of Ideco direct sales on the Pacific Coast both for domestic and export markets.

R. C. ROBERTS retired June 1 as manager of the Wood River refinery of the Shell Oil Co., Inc. His retirement culminates more than twenty-nine years of service with Shell. He is succeeded by H. D. Dale.

Mr. Roberts began his career as tail houseman with Shell in 1917, at a topping plant in Martinez, California. In 1928, he became manager of the Arkansas City refinery and has since been manager successively at the East Chicago and Wood River plants. Mr. Roberts plans to reside at his country home near Elgin, Illinois.

Mr. Dale also has had a long career with the company, having served continuously since 1924. His first job was tank gauger at Wood River after his graduation from the University of Pittsburgh in 1924. In 1941 was made superintendent of the refinery. He was transferred to New York in 1944 as manager of the operations department and advanced to the position of assistant to the vice president.

Mr. Dale recently returned from an inspection trip of both Germany and Japan as a petroleum manufacturing expert with the Strategic Bombing Survey Mission. He visited most of the industrial plants in western Europe and last fall witnessed the results of the atomic bombing of Nagasaki and Hiroshima.

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Form Consulting Firm

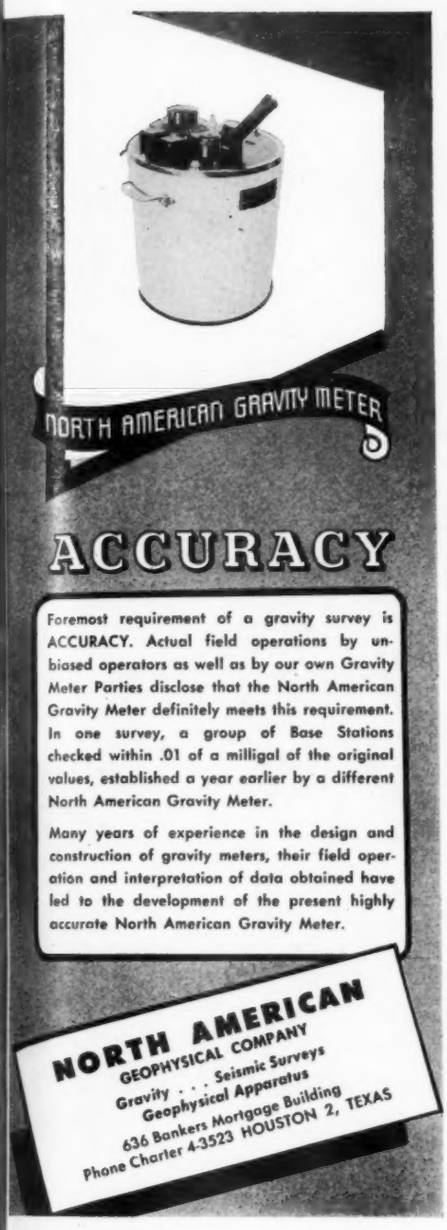
E. O. BENNETT, James O. Lewis and D. G. Hawthorn have formed a partnership in Houston, Texas, under the firm name of Petroleum Consultants. The members are well known production engineers and geologists and will specialize in consulting service in the producing branch of the industry.

Plans Training Stations

AFTER a 10-year absence from retailing Standard Oil Company of Indiana soon will begin operating 100 stations scattered through its marketing area. Each will be a training station with classroom facilities for dealers and their employees.

Emsco Bulletin

Emsco Derrick & Equipment Co. has published a comprehensive bulletin covering the Emsco bulge type portable drilling masts. This bulletin explains in detail the erection procedure, various safety features and operational data of this latest type mast.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Oil Division's Plans

Interior's new Oil and Gas Division hopes to start out with some 50 employees and $472,000 in funds with which to complete its organization and get launched on its career of guiding government activities relating to the petroleum industry. More than half of this amount, $247,000, is already assured, having been allowed by the House for the use of the Petroleum Conservation Division whose functions are to be assumed by the new oil and gas set-up.

There is some speculation, particularly among natural gas interests, as to how far the new Oil and Gas Division will get over into the field now occupied by the Federal Power Commission. In ordering Interior Secretary Krug to set up this peacetime counterpart of PAW, the President suggested that "steps should now be taken to assure coordination in peacetime of the federal government's many interests in petroleum, petroleum products and associated hydrocarbons" and that the new agency should act as "the liaison agency of the government in its relations with appropriate state bodies concerned with oil and gas."

A strong intimation has been thrown out that next year Interior will ask Congress to amend the Connally "Hot Oil" act to include natural gas. In reply to a question as to whether natural gas now comes under the act, Edward B. Swanson, acting chief of the Petroleum Conservation Division said:

"That is a hard question to answer because it is a point that has never been finally determined. My own view is it does not come under the act. Also, it should come under the act. . . . I think it is possible that maybe by the time we come up again next year (for hearings on the 1948 Interior appropriation bill) we may have some recommendations for an amendment to the act which would broaden it so as to include natural gas."

Corrosion Research Begun

DOW CHEMICAL COMPANY has completed a new building at Midland, Michigan, where a research program in industrial corrosion will be undertaken. Studies will be made of possible cathodic protection of storage tanks, ship hulls, heat exchangers and other industrial equipment.

Bradley Leaves Navy

Lieutenant Commander Robert J. Bradley, USNR, has doffed his uniform to go with DeGolyer & MacNaughton, Dallas, consultants. He had been serving with the Naval Petroleum Reserves office in Washington. Prior to the war, Bradley was with Standard Oil of California in San Francisco and in Saudi Arabia.

Thermoid Field Manager

Paul Kelting has been named field manager of the Thermoid oil field products division, and Earl Johnson has been made oil field product sales representative in Oklahoma. Mr. Kelting will supervise sales and service activities in Midcontinent and Gulf areas. He joined Thermoid in 1945 as district manager of the Houston branch. Mr. Johnson will operate from Oklahoma City headquarters.

Foreign Oil Interests Booklet

"American Petroleum Interests in Foreign Countries," the subject of hearings held by the Senate Special Committee Investigating Petroleum Resources under date of June 27 and 28, 1945, has been released for publication. The Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., will sell the booklet, containing approximately 500 pages, at $1.00 per copy.

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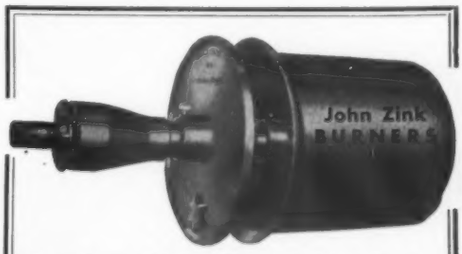

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From an address by Eugene Holman, President, Standard Oil Company (New Jersey)

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